CALS TEST NETWORK

CTN Test Report
91-019

UCRL-ID-108746

Engineering Data Transfer Test with DSREDS MICOM using MIL-R-28002 (Raster)

Laboratory Acceptance Test

October 15, 1991

Prepared for
Air Force Logistics Command

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APPENDIX A AUDRE, Inc. Test Report

1.0 INTRODUCTION.

AUDRE, Inc. participated in the evaluation process as an independent observer having commercial raster experience. The evaluation process consisted of on-site testing and evaluation, and an off-site audit. On-site DSREDS testing occurred February 20, 1991 at the MICOM facility in Huntsville, Alabama. As a member of the CTN test team, AUDRE, Inc. was tasked to observe the physical testing and to comment on productivity issues which could possibly arise. In addition, AUDRE, Inc. was asked to audit the results of the Data Interchange Process. During this audit a test tape was evaluated for compliance to MIL-STD-1840A standards and MIL-R-28002 issues (native DSREDS).

2.0 METHODOLOGY.

In order to conduct this audit, preliminary preparation was required to become familiar with LLNL/CTN raster test node. All standards, specifications and other pertinent reference material were collected and organized to create an in-house CALS library. All test plans were studied; standards and specifications were reviewed in detail. In addition, in-house batch software routines for automated data testing and analysis for CALS compliance were built. The results of this audit are discussed as follows.

a. On-site testing.
b. MIL-STD-1840A validation and verification issues.
c. MIL-R-28002 (native DSREDS Data) validation and verification issues.

The following attachments are made a part of this appendix:

Attachment 1 - MIL-STD-1840A Validation program.
Attachment 2 - MIL-R-28002 Validation program.
Attachment 3 - Visual Analysis of images.

3.0 ON-SITE TESTING.

Two contractors, Intergraph and AT&T, were involved during on-site testing. Intergraph provided the front-end CALS translation tools which converted the data from CALS to DSREDS format and vice versa. The DSREDS system contains AT&T equipment and AT&T performed as system integrator concerned primarily with the transition of data from the Intergraph system into the existing DSREDS system.

3.1 Testing.

The MIL-STD-1840A tape containing the test suite was successfully loaded on the Intergraph workstation. Each file was converted from CALS format to a separate Group 4 file and header file. The Group 4 data was then converted to Intergraph RLE format. During this process, the errant file D001R013 was correctly found. In addition errors in record 9 (rpelcnt field) were flagged in files D001R007 and D001R008.

The files were converted from RLE format to DSREDS import file format (TIF in stream format). The import-export facility in place is designed to move large amounts of data from one place to another and was developed by AT&T. The import files were then transferred to a mainframe DSREDS IPL via Ethernet TCP/IP. Using GET, the file transfer for a 1.9MB file across the campus network took about 61 seconds, which is quite good for DSREDS needs.

A quality assurance (QA) review on the DSREDS system was performed. Each file was displayed on a graphics terminal and the operator panned around the images searching for idiosyncracies which could be attributed to incorrect decoding. None were found.

After the QA review, the files were written to optical disk and they became a permanent addition to the DSREDS archival system.

Native DSREDS files were added to the collection of files. The files were formatted to the export file format and all files were PUT across the Ethernet back to the Intergraph workstations.

On the Intergraph workstations, the files were converted back to RLE format, then to Group 4 and header files, and finally to CALS format. A MIL-STD-1840A tape was then generated.

3.2 Discussion.

On-site testing successfully demonstrated that the DSREDS system could receive and generate CALS MIL-STD-1840A/MIL-R-28002 data. The volume of data and the demand for the DSREDS system will determine the system performance. Given the current DSREDS configuration, the following could be areas of concern.

Most obviously, the several file format conversions should not occur. Ideally the system should allow the operator to insert a magnetic tape into a workstation, type in the command and walk away. This is feasible within the demonstrated working configuration through the combined efforts of AT&T and Intergraph.

Secondly, the campus network poses a potential bottleneck. The raster files being moved across the network are quite large, and given a large volume of magnetic tapes the network could be seriously overburdened. This could affect not only DSREDS users but all campus network users. To test the system for this bottleneck, it is recommended that testing be conducted using several

workstations simultaneously transferring data across Ethernet to and from DSREDS. This may or may not have been tried.

Another major area of concern is going to be the final QA of the files. This will always require visual interpretation from the operators. However, some of this can be made more efficient by using automated techniques. The test provided by Intergraph to flag rotation anomalies based on the image aspect ratio is an excellent example of where this could be automated. Other routines exist which can flag images with an unusually high density, indicating a poor scan quality.

4.0 MIL-STD-1840A PACKAGING.

The box contained one 12-inch reel of 9-track magnetic tape packed in a zip lock bubble pack indicating anti-electrostatic properties. Inside, the box was lined with a shock absorbent fiber padding material. The tape was appropriately labeled, indicating its digital identification, format structure, and encoding density. A listing of the CALS contents was also provided. In general the tape was packaged commensurate with MIL-STD-1840A (5.3 Packaging) as "... using best commercial packaging..."

5.0 MIL-STD-1840A TESTING PROCESS.

The contents of the tape were indexed in accordance with paragraph 5.1 File Structure for transfer and paragraph 5.2.1.1 Volume Identifier. Analysis of the index verified that it contained no errors.

The declaration file, "D001" was read from the tape and its contents were printed. Analysis of the print out verified there were no errors in file name or content as specified in paragraphs 5.1.1.1 Declaration File Name, 5.1.1.2 Declaration File Content, and 5.2.1.3 Declaration File.

As specified in paragraph 5.1.3, the data file names were checked and found to contain valid file names. The data files were read from the tape and each file verified for compliance with MIL-STD-1840A paragraph 5.1.4.4 Raster Data File Header Records, and paragraph 5.2.1.6 Raster Files. Each data file header record was extracted, printed and verified as to proper format and content. Specifically, the data file header records were checked for form only and the actual analysis of the contents of the CCITT data and records 7, 8, 9 and 10 were verified as part of MIL-R-28002 testing. All data file headers were successfully extracted and all records were present in the data file header records. One error was recorded for each file in the "srcgph: " record in which the product data field contained the lower case string "none". MIL-STD-1840A specifies an upper case string "NONE" for this field. A second error was recorded for each file in the "notes: " record, in which a blank string was given. MIL-STD-1840A specifies that the upper case string "NONE" should be provided if no relevant data is given.

5.1 Summary of MIL-STD-1840A Compliance.

Two minor errors were found in each of the data files. The first error was found in the "srcgph: " record which contained the lower case string "none". This violates the requirement in paragraph 5.1.4 which specifies that the upper case string "NONE" must be used. The second error was found in the "notes: " record. In each of the data files, the blank string was found following this record. This also violates the requirement in paragraph 5.1.4 which specifies that the ASCII string "NONE" should be used if no relevant data is placed in this field.

6.0 MIL-R-28002 TESTING PROCESS.

MIL-R-28002 testing includes both automated and visual testing. Attachment 2 contains the log of the automated testing, which includes the checks on records 7, 8, 9 and 10 of the data file headers and especially the CCITT Group 4 encoding.

6.1 Automated Testing.

The first step in MIL-R-28002 testing is automated testing to verify the Group 4 data. All raster files on the DSREDS tape, including the native DSREDS data, contained valid group 4 data. All files were converted to bitmaps successfully.

Records 7, 8, 9 and 10 were checked for compliance on all files. All files specified raster type I data in record 7 and valid raster type I data was verified on all files. Record 8 was verified in all files as to permissible pel path and line progression values, but were not checked for consistent values in the header and image file. Record 9 was examined to ensure that the image width and height contained positive integer values, represented the actual image width and height, and that it conformed to the recommended values in the standard. The files D001R002, D001R003, D001R004, D001R006, D001R007, D001R009, D001R014, D001R015, D001R016, D001R017, D001R018, D001R019, D001R020, D001R021, and D001R022 did not conform to the recommended values for North American or metric drawing sizes. This however was considered a minor detail and flagged as a warning only. The density found in record 10 was 200 in all the files and is considered a permissible value.

All automated testing demonstrated valid MIL-R-28002 files.

6.2 Visual Testing.

The second step in MIL-R-28002 testing was visual. The correct decoding of the Group 4 data was verified visually on all files by looking for data irregularities, such as premature end of file, odd inclusions, etc. All files were decoded correctly without error based on this inspection.

Verification of correct image orientation values as given in record 8 were checked visually. Two files, D001R005 and D001R006, were found to have different orientations from those specified in the file headers. Record 8 in the header of D001R005 "rorient: 090,270", specified a pel path of 90 and a line progression of 270. The actual data contained a pel path of 270 and a line progression of 90. Record 8 in the header of D001R006, "rorient: 090,270", incorrectly specified a pel path of 90 and a line progression of 270. The record should have read "rorient: 0, 270", specifying a pel path of 0 and line progression of 270. The values which were given in record 8 of these two files were permissible values; however,they do not correspond to the actual data found in the images.

A visual QA check was performed on the scan quality of the images. The results listed in Attachment 3 are provided for informational purposes only and do not impact adherence to the standards.

The files D001R010, D001R011, D001R0012 and D001R0013, were considered to be of inadequate quality. These drawings contained a lot of noise, thresholding needed to be adjusted on the scanner, and text existed on the files which was unreadable. These files were not worth keeping in an archival system, such as DSREDS. A lot of noise present on an image will severely increase valuable storage requirements as well. On these four drawings a simple stray pixel removing routine was run which removed all stray pixels from the raster data. The filter was set so that much of the noise remained, but no pertinent information was removed. The resultant compressed Group 4 data was reduced in size as follows: D001R13 by 12 percent, D001R011 by 10 percent, D001R012 by 12 percent and D001R013 by 10 percent. In contrast, a good quality scan such as D001R012 was decreased by less than 1 percent.

Two of the files were somewhat skewed. D001R020 was a good quality scan but was skewed at a one degree angle. This is considered to be a very large skew and is disturbing to the naked eye. D001R022 was also skewed but not as extreme. It is recommended that this type of problem be corrected by rescanning the documents.

6.3 Summary of MIL-R-28002 Compliance.

The automated testing demonstrated all the files present on the tape were valid MIL-R-28002 files. The Group 4 decoding was found to be valid both digitally and visually. The two orientation errors flagged should be corrected. Files that are of inadequate quality should be rescanned if they are to remain in the DSREDS archival system, although this does not affect compliance.

October 15, 1991

DISCLAIMERS

This report and those involved in its preparation do not endorse any product, process, or company stated herein. Use of these means by anyone does not imply certification by the CALS Test Network.

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APPENDICES

Executive Summary

This report represents the CALS Test Network (CTN) participation in the Laboratory Acceptance Test (LAT) of the Army Digital Storage and Retrieval Engineering Data System (DSREDS) Computer-aided Acquisition and Logistic Support (CALS) modification project. The LAT is conducted in the development environment and is intended as an audit of the vendors solution strategy before committing to a field implementation for User Application Testing. It is considered the first step in the testing process and is identified by the generic CTN test plan as "Development Level Testing."

The LAT concept was developed to address the evaluation of CALS implementations at the three types of Department of Defence (DoD) engineering data repositories: DSREDS (the Army's system), EDCARS (the Air Force's Engineering Data Computer-Assisted Retrieval System), and EDMICS (the Navy's and Defense Logistics Agency's Engineering Data Management Information and Control System). A LAT differs from the more common CTN Quick Short Test in that it is a more formal, in-depth test.

The modifications to DSREDS, required for CALS compatibility, were implemented on a test platform networked to the DSREDS Host system at the U.S. Army Missile Command (MICOM) installation in Huntsville, Alabama.

As outlined in the plan to "Bench Test" this modification, the system being tested converted the CTN Raster Test Suite to DSREDS native format. That test image data was then passed through the DSREDS quality assurance (QA) process, released to the DSREDS database, and archived on optical disk.

DSREDS demonstrated that the data had been properly archived by retrieving the test images from optical storage, annotating (red-lining) them with the character string "DSREDS", converting the images back to MIL-R-28002 (28002) format, and writing them to a CALS tape. The CALS tape was packaged, commensurate with MIL-STD-1840A (1840A), and mailed to the CTN for evaluation.

The process of sending known data through a system being tested is identified as CTN Loop-through testing. The data coming back through the loop is compared to the data that initially entered the loop. Data aberrations indicate anomalies in the system's CALS capabilities. Special encodings have been provided to verify that the data being returned to the CTN has, in fact, been processed by the system being tested.

The DSREDS CALS modification was implemented on an Intergraph Sub-system networked to an existing DSREDS Host. The Sub-system translates raster image data between the CALS format and the DSREDS export format.

The Sub-system and Host communicate via Ethernet, using TCP/IP protocol, transferring export format image data back and forth. The origin of the export data is transparent to the DSREDS Host, which processes the data items as though they had originated from another DSREDS site.

The Intergraph Sub-system being tested was interfaced to a production DSREDS Host system at MICOM. Testing was conducted in parallel with normal DSREDS production operations. This situation provided the opportunity to combine elements of the LAT (or Development Level Test) with elements of the User Applications Test (UAT).

The LAT and subsequent evaluation of the Loop-through data indicated that the proposed modifications to the DSREDS system will be able to provide DSREDS with the capability to interchange raster data with other CALS participants.

The data interchange demonstrated no substantive difficulty in dealing with the CALS data requirements, in either media format or data content issues. All the images interchanged at the closure of the Loop-through test were displayed by the CALS Test Network Office (CTNO) Test Bed at LLNL (CTNO/LLNL) without incident.

However, three exceptions were noted during testing. The issues are documented in the text of this report and were subsequently addressed with Follow-on tests. The reader is directed to Appendix D for more details.

The CTN analysis indicates that the DSREDS CALS implementation is technically capable of accomplishing CALS MIL-R-28002 Type I digital raster data interchanges with other "CALS ready" systems in a single-tape-volume mode.

The CTN recommends that the existing capability be employed to attempt a wide range of data interchanges. The object of such exercises should focus on application issues, in terms of interchange procedures, data characterization, data volume, frequency, and performance. This information can be used later to define functional requirements for tailoring applications and optimizing the system.

1 Introduction

This report presents the Laboratory Acceptance Test (LAT) of the proposed DSREDS CALS modification. The LAT, or Development Level Test, is a two-part process. First, the system being tested is provided input data to exercise operational functions. After being processed, these same data items are output and analyzed to further evaluate the system's capabilities.

Typically, the first step is conducted at the development site, while subsequent analytical activities are undertaken at a CTN Test Bed. Iterations of some portions of the test may be required to clarify results or to accommodate and verify system adjustments. These iterations are identified as Follow-on tests.

The first step of the LAT was conducted at the U.S. Army MICOM facility. The results were analyzed by the CALS Test Network Office Test Bed at the Lawrence Livermore National Laboratory (CTNO/LLNL). Follow-on tests were conducted and are presented in Appendix D.

1.1 Background

The DoD Computer-aided Acquisition and Logistic Support (CALS) Test Network (CTN) is tasked to conduct tests of the military standard for the Automated Interchange of Technical Information (MIL-STD-1840A) and its companion specifications.

The primary purpose of the CTN is to evaluate the effectiveness of the CALS standards for technical data interchange and to demonstrate the capability and operational suitability of these standards. To this end, testing should represent the systems and applications in use by government and industry.

Comprehensive testing of sub-systems and/or fully-integrated applications is intended to evaluate the readiness of a system to participate in CALS data interchanges and establish the level of capability at which these interchanges foster data interoperability.

A significant near-term CALS objective is for DoD engineering data repositories to distribute, receive, and exchange engineering drawing information in digital form. Interchange of raster image data, in accordance with MIL-STD-1840A, is the first step in meeting this objective.

Both DSREDS and EDCARS are undergoing modifications to provide the capability to accept and distribute image data in a MIL-STD-1840A form. A third system, EDMICS, was designed subsequent to the CALS standards and is expected to be "CALS ready" upon implementation.

The CTN has been tasked to draft an overall test plan covering the technical issues associated with the application of MIL-STD-1840A and provide input to the designated office responsible for the preparation and execution of system acceptance testing of the DSREDS, EDCARS, and EDMICS systems. The CTN and the National Institute of Standards and Technology (NIST) provided technical support during the testing process.

Implementing the CALS data interchange strategy between the DoD facilities and commercial vendors is an important step in demonstrating the government's commitment to establishing a standard digital interface.

1.2 Purpose

The objective of this test is to perform Development Level Testing (Laboratory Acceptance Testing) of the proposed DSREDS CALS modification and evaluate the CALS capability being provided. The successful completion of this test will help assure that one of the major elements in the DoD infrastructure (DSREDS) will be capable of exchanging digital raster data using the CALS standards.
Testing was conducted on the DSREDS development platform. This allowed the test process the flexibility of accessing all aspects of the function being developed for integration into the DSREDS operation.
The CTN test data was passed through the system and evaluated for structure and integrity. Additionally, data items currently resident on the DSREDS system were transferred back to the CTNO Test Bed for evaluation.

2 Testing Outline

2.1 Locations

Laboratory Acceptance Testing of the CALS modifications intended for implementation on DSREDS was conducted in conjunction with the production DSREDS system at the Army MICOM installation in Huntsville, Alabama.

Analysis of the data generated by the LAT was conducted at the CTNO Test Bed at the Lawrence Livermore National Laboratory. An independent evaluation was conducted by AUDRE, Inc.

Conformance testing of the Sub-system's capability to decode and encode CCITT Group-4 data formats is being conducted by NIST through an independent contractor's facility.

2.2 Test Plan

The CALS Test Network Test Plan (24 December 1990) outlines the basic objectives and philosophy of the CTN test strategy. The DSREDS, EDCARS, and EDMICS Program Offices have jointly established a Test Team (DEETT) which, under the direction of the CTNO, developed a Detailed Test Plan for the DSREDS LAT.

It was anticipated that test plans would continue to evolve up to the time of an actual test. A copy of the test scenario proposed by the CTN for the DSREDS LAT (or Development Level Test) is provided in Appendix B.

CTN testing incorporated agreements made at the pre-test discussions with the DSREDS Program Manager (PM) and representatives of the contractors constituting the DEETT. The base-line assumptions, and substantive issues, arising from the discussions and germane to the test, follow:

1. The DSREDS system is an existing digital data system with the capabilities to scan, edit, compress, and store raster images in a native format.

2. Existing DSREDS functionality is operational in a number of production environments and is not intended for re-certification.

3. Modification of the DSREDS system has been undertaken to provide a CALS import/export option. The expected functionality will translate raster image data between CALS and DSREDS image data formats.

4. CTN testing will evaluate this newly-implemented capability to determine if the modification has the capability to render DSREDS "CALS ready."

5. The CTN will be available to assist the DSREDS PM in evaluating the impact of this modification on a production DSREDS system.

Test requirements established by the DSREDS PM, through the DEETT, stipulated that the CTN Raster Test Suite be processed through the complete DSREDS data system. The following Loop-through test script was proposed:

1. Read in CTN test data.
2. Convert from CALS to DSREDS format.
3. Present test data for DSREDS QA and acceptance.
4. Annotate test data, indicating acceptance.
5. Release test data onto DSREDS optical disk.
6. Retrieve test data from DSREDS optical disk.
7. Retrieve native data from DSREDS optical disk.
8. Convert retrieved data to CALS format.
9. Send CALS data to CTNO for evaluation.

In the process of manipulating the CALS data, the test would evaluate the system's ability to read and write MIL-STD-1840A magnetic tapes, as well as to process MIL-R-28002 Type I raster image data.

To accommodate testing, the CTN provided the Raster Test Suite and the technical support to apply that data to the testing process. Additionally, the CTN solicited an independent observer (AUDRE, Inc.), with commercial raster experience, to participate in the evaluation process. The observer audited the test process and wrote a report of its findings. A copy of that report is attached as Appendix A.

The DSREDS and contractor personnel provided the expertise to operate the system during the test. Data tapes generated as part of the CTN test process were packaged and shipped (per MIL-STD-1840A) to the appropriate CTN organization for evaluation.

3 Laboratory Acceptance Test Parameters

Dates:

Huntsville LAT test	20 February 1991

Evaluators:

CALS Test Network Office Test Bed
Lawrence Livermore National Laboratory
P.O. Box 808, L-542
Livermore, CA 94551

AUDRE, Inc.
10915 Technology Place
San Diego, CA 92127

LAT Attendance:

Henry Younger	DSREDS PM
Gerald Howard	DSREDS PM
Violet Stephens	DSREDS PM
Johnnie Morgan	DSREDS PM
Ed Turos	DSREDS Vint Hill
Kin Chan	PM CALS
Greg Diamond	ACCURATE
Don White	ACCURATE
Steve Walker	JCMO
Fremont Tittle	CTNO
Nick Mitschkowetz	CTNO/LLNL
Melody deJong	AUDRE
Willie Howard	AT&T
Mark Reed	AT&T
Jim Foscue	INTERGRAPH
Mark Moss	INTERGRAPH
Dean Rice	INTERGRAPH

Data types:

MIL-R-28002 Type I high-contrast binary image data representing CTN test images and selected engineering drawings from various DoD applications.

System Description:

CALS Sub-system	Intergraph UNIX platform
DSREDS Host	IBM main-frame
Network	10MB/Ethernet

4 Laboratory Acceptance Test Summary

Huntsville, 20 February 1991
(For additional LAT detail see LAT Notes Appendix C)

Laboratory Acceptance Testing of the CALS modifications, intended for implementation on DSREDS, was conducted on an Intergraph UNIX platform, networked to the DSREDS Host at the Army MICOM installation. This was essentially a workbench test conducted at a production DSREDS site.

Only CALS format and media issues were addressed. All test procedures and materials were supplied by the CTN, the intent being to evaluate the CALS capabilities supported by the modification.

The raster reference data were generated on the CTN Sun 3/280 test platform. The MIL-R-28002 data files used "space" characters to pad the header to 2048 bytes. These data were successfully read by the Intergraph Sub-system.

All CCITT Group-4 images were successfully retrieved from the MIL-R-28002 Type I files read from the MIL-STD-1840A test tape. Each image was converted to an Intergraph Run-Length Encoded (RLE) format in the process.

The CTN Raster Test Suite was presented as "generic" MIL-R-28002 data. The DSREDS Host data-import process required that specific Hollerith data be included. This capability was provided on the Intergraph Sub-system which populated the CALS image files with the DSREDS-formatted Hollerith information in preparation for the data acceptance QA process.

The Intergraph Sub-system provided the first stage of QA, successfully detecting the Group-4 encoding error placed in test file D001R013 by the CTN. Through the automated QA process, several other images were flagged for possible errors. The DSREDS automated QA strategy involved evaluating image and header data (such as line count and orientation) to detect possible inconsistency. Data anomalies could then be confirmed or denied by viewing the RLE-formatted images on the Sub-system monitor.

Intergraph converted the RLE files to the DSREDS export format and, through an Ethernet connection, passed them to the DSREDS Host using a TCP/IP utility. The DSREDS Host converted this export format into the native DSREDS format and released the CTN data into the DSREDS database. The images were displayed again, this time on a DSREDS Mainframe QA workstation. On completion of the QA, the test images were written to the optical archive.

The completion of the test required the retrieval of the CTN test data from DSREDS optical storage. A "red-line" modification of the retrieved images indicated that they had indeed been processed by DSREDS. The modified data was then exported back to a CALS format. The resulting MIL-STD-1840A tape was sent back to the CTN for analysis, along with several DSREDS native images which had also been extracted and converted to the CALS format.

A multiple volume tape test was developed to demonstrate the system's capability to read and write groups of contiguous images, spanning more than one reel (volume) of tape. This test could not be performed during the LAT because the CTN had provided tapes which were too small in diameter to successfully load on the Intergraph tape auto-load drives.

A subsequent Follow-on test was scheduled, providing DSREDS with a larger set of MIL-STD-1840A tapes which had been artificially shortened to produce an overflow condition while loading image D001R005 of the CTN Raster Test Suite. The reader is directed to Appendix D for documentation of Follow-on testing.

The LAT, and subsequent evaluation of the Loop-through data, indicated that the proposed modifications to the DSREDS system will be able to provide DSREDS with the capability to interchange MIL-R-28002 Type I raster image data with other "CALS ready" participants.

The data interchange demonstrated no substantive difficulty in dealing with the CALS data format or data content issues. The Loop-through images interchanged at the closure of the Follow-on test were displayed by the CTNO/LLNL Test Bed without incident.

CTN analysis indicates that the DSREDS CALS implementation is technically capable of accomplishing CALS MIL-R-28002 Type I digital raster data interchanges with other "CALS ready" systems in a single tape volume mode. This restriction is based on the system's current implementation of the ANSI X3.27 tape utility which is able to read multi-volume ANSI tapes but is not able to write them.

Of the exceptions noted in the original test process, the only outstanding issue is the generation of an ANSI X3.27 multi-volume tape set. The reader is directed to the Follow-on test detailed in Appendix D.

The CTN recommends that the existing capability be employed to attempt a wide range of data interchanges. The object of such exercises should focus on application issues, in terms of interchange procedures, data characterization, data volume, frequency, and performance. This information can be used later to define functional requirements for tailoring applications and optimizing the system.

5 Analysis Parameters

Dates:

CTNO/LLNL Analysis	25 February to 5 March 1991

Tools Used:

Sun 3/280

TAPETOOL	CTN UNIX tape evaluation routine
CALSTB.350	CTN UNIX CALS raster utility

DEC MicroVAX II

TAPETOOL	CTN VMS tape evaluation routine
VALIDG4	VMS CCITT Group-4 evaluator

Standards Applied:

MIL-STD-1840A
MIL-R-28002
CCITT Recommendation T.6
ANSI X3.27

6 Data Analysis

The CTN Raster Reference Suite files released by DSREDS, along with random native DSREDS data, were returned to the CTN as proposed by the Loop-through test scenario. The information was written to one MIL-STD-1840A magnetic tape and mailed to the CTNO/LLNL.

6.1 1840A Packaging

The mailing consisted of a carton conforming to the PPP-B-636 specification. The box was labeled with the appropriate markings indicating fragile contents, sensitive to magnetic fields.

The box contained one 12-inch reel of 9-track magnetic tape packed in a zip-lock bubble pack indicating anti-electrostatic properties. Inside, the box was lined with a shock absorbent fiber padding material.

The tape was appropriately labeled, indicating its digital identification, format structure, and encoding density. A listing of the CALS contents was also provided.

6.2 1840A Transmission Envelope

Tape Formats:

The first several blocks of raw tape data were dumped using the DEC/VMS "dump" utility. The information indicated that the tape contained ANSI X3.27 formatted data originating from a UNIX based system with an owner identification of "DSREDS".

After this preliminary check, the tape was processed through the CTN automated tape evaluation utility TAPETOOL.

A non-fatal MIL-STD-1840A error occurred in every file read from the tape. The errors indicated that the last tape block in each file had been truncated to the length of the remaining data bytes. Though not fatal to the CTNO Test Bed, this situation might cause problems for systems using tape drives that are not capable of reading very short data blocks.

The CTNO asked Intergraph to make the appropriate software adjustment and demonstrate the fix in a Follow-on test which was successfully concluded, as outlined in Appendix D.

Declaration Files:

The tape was mounted on the Sun 3/280 test platform and parsed using TAPETOOL. The automated tape testing utility identified one declaration file and twenty-two raster image files.

Header Fields:

All raster file headers were structured as required. Some "note: " fields (header record-11) were left blank. MIL-STD-1840A requires that the literal string "NONE" be entered in unused fields. Good documentation practices would dictate the use of a descriptive narrative to facilitate data identification.

Multiple tape volume:

The multiple tape volume read and write test was re-scheduled for a Follow-on test due to physical tape reel incompatibilities. The CTN tape reels used for this test were too small to allow the Intergraph tape drive to load the tape properly.

The CTN restructured the multiple volume read and write test using larger tape reels. A new tape set was shipped to Intergraph by the CTNO/LLNL. This test was designed to demonstrate the successful reading and writing of multiple ANSI X3.27 tape volumes without requiring CTN observation.

Volume-1 of the two-tape set had been artificially shortened, leaving enough tape to contain the first four images of the CTN Raster Test Suite. Image five, which had been altered to distinguish it from the standard distribution version, was forced to span between volume-1 and volume-2.

The test involved reading and reconstructing image five and rewriting the multi-volume tapes. The results of the test indicated DSREDS could read multi-volume tapes, but was unable to write them. This issue is addressed in Appendix D.

6.3 28002 Raster Analysis

General observations:

All images were viewed on the CTNO/LLNL Sun 3/280 test platform using the CTN CALSTB.350 utility.

As required, the first five CTN Raster Test Suite images were returned with the character string "DSREDS" annotated in the drawing title block. This confirmed that the images had been decompressed into a bit-map, edited, and re-compressed by a DSREDS encoding algorithm.

All the test images, except one, returned intact. No perceptible data aberrations were introduced as a result of the various data transfers and encodings. The exception occurred after the end of the second synthetic Huffman file. The anomaly was not considered fatal since all the Huffman data had been handled correctly. Follow-on testing resolved the issue; the reader is referred to Appendix D.

Successful Huffman tests indicated that the Intergraph Sub-system can recognize and produce all the Huffman codes specified in tables 2 and 3 of CCITT Recommendation T.6.

The native DSREDS images transferred back to the CTN decompressed and displayed without anomaly. All images were centered in the display format and appropriately cropped. The aspect ratios appeared reasonable with no artifacts displaying too "fat" or too "thin." Parallel lines were linear leaving no perceptible image distortion. The images were complete with no obvious dropouts or misalignments due to scan errors. The images showed good contrast with no excessive background noise.

Specific observations and exception:

The Huffman data anomaly originally detected in image D001R007 was traced by the Follow-on test to an image editing routine. Apparently some pixel edit programs (commercial and share-ware) are sensitive to very small raster images and may introduce random data.

Files selected for hand decoding:

Two files were chosen for hand decoding. One, a native DSREDS file, was decoded to establish that DSREDS Group-4 encoding was in fact two-dimensional. The other, one of the returned synthetic files, was decoded to determine if the system had expanded the Group-4 data into a bit-map before compressing and returning it to the CTN for evaluation.

All the Raster Test Suite images that survived the DSREDS QA process to complete the Loop-through test had the correct orientation entered in header record-8. One of the images, when returned, did not have the correct orientation attribute.

Orientation is not a function of the CALS modification; it concerns the operation of the utility. When generating data for CALS distribution, production personnel should be instructed to recognize and enter the correct orientation parameters, as required.

6.4 Hand Decoding MIL-R-28002 Files:

In order to determine that the systems being tested have implemented a two-dimensional encoding scheme, as opposed to a simple one-dimensional RLE strategy, linkage between two contiguous encoding lines must be demonstrated. A manual decoding of Group-4 data is required.

This analysis is also required to detect if the CALS data being returned was actually decoded into a bit-map before being sent back to the CTN in a CALS format.

6.4.1 File: D001R014

File Header Records

rcdocid:	CALS6 18876001 000 BX 001 001 UDCETN
dstdocid:	NONE
txtfilid:	NONE
figid:	NONE
srcgph:	none
doccls:	NONE
rtype:	1
rorient:	090,270
rpelcnt:	000128,000128
rdensty:	0200
notes:	

File Structure (MIL-R-28002)

File size:	2304 bytes
Header Block Size 2048:	YES
Record Size 128:	YES
Header Block Padding:	"space" characters
Last Block Padding:	none, a non-fatal error

File Structure (CCITT Recommendation T.6)

First line decoding:	Valid T.6 Group-4 encoding

```
Octal:   023252           031072           106277
Binary:  0010011010101010 0011001000111010 1000110010111111
T.6:     001
         hor.-mode
            00110101
            term.-white(0)
                    010
                    term.-black(1)
                       1
                       vert.(0)
         ----------------- NEW_SCAN_LINE ------------------
                        0 001
                        pass-mode
                             1
                             vert(0)
         ----------------- NEW_SCAN_LINE ------------------
                             001
                             hor.-mode
                                000111
                                term.-white(1)
                                      010
                                      term.-black(1)
                                           1
                                           vert.(0)
         ----------------- NEW_SCAN_LINE ------------------
                                           0001
                                           pass-mode
                                               1
                                               vert.(0)
         ----------------- NEW_SCAN_LINE ------------------
```

Note:

The first new scan line, (a blank line) is vertically encoded as opposed to the horizontal encoding provided in the distributed raster test suite.

6.4.2 File: D001R020

File Header Records

srcdocid:	11508910/01 18876001 A000 BX 001 499UDCATN
dstdocid:	11508910/01 18876001 A000 BX 001 499UDCATN
txtfilid:	NONE
figid:	NONE
srcgph:	none
doccls:	NONE
rtype:	1
rorient:	090,270
rpelcnt:	002640,001929
rdensty:	0200
notes:	

File Structure (MIL-R-28002)

File size:	20608 bytes
Header Block Size 2048:	YES
Record Size 128:	YES
Header Block Padding:	"space" characters
Last Block Padding:	none, a non-fatal error.

File Structure (CCITT Recommendation T.6)

First line decoding: Valid T.6 Group-4 encoding

```
Octal:   034626           164737           173770
Binary:  0011100110010110 1110100111011111 1111011111111000
T.6:     001
         hor.-mode
            1100
            term.-white(5)
                11
                term.-black(2)
                  001
                  hor.-mode
                     0110 111
                     make-up-white(256)
                             0100111
                             term.-white(18)
                                    011
                                    term.-black(4)
                                       1
                                       vert.(0)
         ----------------- NEW_SCAN_LINE ------------------
                                        11 111
                                        vert.(0)  x5
         ----------------- NEW_SCAN_LINE ------------------
                                              1
                                              vert.(0)
                                               011
                                               vert.-right(1)
                                               111
                                               vert.(0) x3
         ----------------- NEW_SCAN_LINE ------------------
```

Note:

The vertical mode codes indicate the compression is two-dimensional.

7 Conclusions and Recommendations

7.1 Test Results

The strategy taken to implement DSREDS CALS capability is appropriate. The bottom-up implementation approach is commensurate with the continued development of the overall CALS goals.

The test platform was able to read the MIL-STD-1840A tape and underlying ANSI X3.27 format. A range of data output, typical of the current attempts being made to address the CALS requirements, was provided to determine the flexibility of the system to accept variant data forms. The indications are that the system is sensitive to some variants such as circumflex accent padding in the middle of a file, recognizing them as "Null" data.

The test platform software implemented to decode the MIL-R-28002 image files recognized the CALS header data. Image attributes from the header were used by the system to audit the orientation parameters.

The CCITT Group-4 data contained in the CTN Raster Test Suite images were successfully decompressed into the appropriate images. After annotation, the test system converted the modified image data back into the CALS format and returned that data to the CTN in the prescribed manner.

The CTN Test Bed at LLNL was able to read and display all the appropriate images. Hand decoding verified that the data had indeed been converted into bit-map form before being returned to the CTN.

Analysis verified the test system's ability to accommodate two-dimensional encoding and decoding. The erroneous encoding planted by the CTN was detected and all the Huffman run-lengths specified by CCITT recommendation T.6 were demonstrated during encoding and decoding.

The noted anomalies that did occur were addressed by Follow-on tests to effect system adjustments and verify capability. The reader is directed to Appendix D for further details.

7.2 Implementation Observations

The bulk of the CALS/DSREDS conversion process was hosted on the Intergraph platform and was transparent to the DSREDS Host. Data import and export functions on the DSREDS system have not required modification, since the Host does not differentiate between CALS and other data sources or destinations at this stage of the process.

The Intergraph Sub-system, networked to the DSREDS Host, handled most of the data interchange operations. This CALS utility was implemented using various software modules accessed by the operator through a menu-driven interface.

The initial CALS utility is broken up into identifiable components which allow for easier alteration, tuning, and optimization. All the components are based on standard products, and to that extent are portable, providing flexibility for future hardware and software integration.

In this implementation, flexibility and functionality are being targeted while production performance issues will require some optimization after development has stabilized. This implementation is a classic "bottom up" design strategy and fits well into the on-going DSREDS effort.

The implementation fits the current operation such that the processing of interchange data on the DSREDS system is transparent to the DSREDS production operation. The modularity of the CALS conversion platform allows for the development and expansion of new capability without impacting production.

In the absence of more specific procedural and application requirements, the strategy taken to implement the DSREDS CALS modification is well targeted.

A pragmatic bottom-up solution, the current implementation has reconciled the detailed CALS data standard requirements with the more global CALS data interoperability philosophy.

The resulting utility does not target a particular application but is flexible enough to attempt a wide range of data interchange activity.

In its present configuration, performance is a secondary issue behind flexibility and modularity. When applications issues become more focused, the system may require optimization to achieve the necessary performance levels.

7.3 Recommendations

The CTN recommends that the existing capability be employed to attempt a wide range of data interchanges. The object of these exercises should focus on application issues, in terms of data characterization, volume, frequency, and required performance. This information could be used later to define functional requirements for tailoring applications and optimizing the system.

Recommendations by the CTN, to replace MIL-STD-1840A (5.3.1.2.Packaging) ASTM-D 39951 packing standard with the more widely known PPP-B-636 standard, will be made. For the purposes of this test, PPP-B-636 was considered commensurate with MIL-STD-1840A (5.3. Packaging) as "...using best commercial practices in the packaging.....".

Although somewhat ambiguously stated in MIL-STD-1840A (5.2.1.6.Raster files), all data blocks in a MIL-R-28002 tape file should be written as full 2048 byte blocks, including the last block. The CTN recommended that Intergraph modify its tape writing utility to pad the last tape block in a file out to a full 2048 bytes. Since CCITT Group-4 data provides for an End-Of-Data flag, the value of the pad character is inconsequential. Using the circumflex accent ("^") would accommodate ANSI X3.27.

Nine-track magnetic tape reels are commercially available in a range of diameters. It has been the CTN's experience that most tape drives have the capability to accept the entire range of available tape sizes. Some auto-loading drives require a manual assist when loading small diameter tape reels. Manual intervention in the auto-loading tape process is time consuming and may not be desirable at some installations. The CTN recommends, placing a warning in MIL-STD-1840A or the MIL-HDBK-59A to bring this issue to the participant's attention.

APPENDIX A AUDRE, Inc. Test Report

Appendix A contains an independent analysis of the DSREDS-generated CALS tapes done by AUDRE, Inc. Their report, along with its three attachments, is inserted as received by CTNO/LLNL, without modification or editing.

```
**************************************************************
*                                                            *
*                MIL-STD-1840A VALIDATION                    *
*                                                            *
*  The program scans and validates the contents of a magnetic *
*  tape for compliance to the MIL-STD-1840A standard.        *
*                                                            *
*                                                            *
**************************************************************


    ******************************************************
    *                                                    *
    *   SCAN THE MIL-STD-1840A CALS TAPE                 *
    *                                                    *
    ******************************************************

rwmt -index

Volume label:
    Volume ID: "TAPE01"    Owner ID: "DSREDS        "  Access: " "
 ------------------------------------------------------------------
| File/Section | File ID   |  Cr Date  | Acc | RF | RL   | BL     |
|--------------|-----------|-----------|-----|----|------|--------|
|    1    1    | D001      | 91/02/25  |     | D  | 260  | 2048   |
|    2    1    | D001R001  | 91/02/25  |     | F  | 128  | 2048   |
|    3    1    | D001R002  | 91/02/25  |     | F  | 128  | 2048   |
|    4    1    | D001R003  | 91/02/25  |     | F  | 128  | 2048   |
|    5    1    | D001R004  | 91/02/25  |     | F  | 128  | 2048   |
|    6    1    | D001R005  | 91/02/25  |     | F  | 128  | 2048   |
|    7    1    | D001R006  | 91/02/25  |     | F  | 128  | 2048   |
|    8    1    | D001R007  | 91/02/25  |     | F  | 128  | 2048   |
|    9    1    | D001R008  | 91/02/25  |     | F  | 128  | 2048   |
|   10    1    | D001R009  | 91/02/25  |     | F  | 128  | 2048   |
|   11    1    | D001R010  | 91/02/25  |     | F  | 128  | 2048   |
|   12    1    | D001R011  | 91/02/25  |     | F  | 128  | 2048   |
|   13    1    | D001R012  | 91/02/25  |     | F  | 128  | 2048   |
|   14    1    | D001R013  | 91/02/25  |     | F  | 128  | 2048   |
|   15    1    | D001R014  | 91/02/25  |     | F  | 128  | 2048   |
|   16    1    | D001R015  | 91/02/25  |     | F  | 128  | 2048   |
|   17    1    | D001R016  | 91/02/25  |     | F  | 128  | 2048   |
|   18    1    | D001R017  | 91/02/25  |     | F  | 128  | 2048   |
|   19    1    | D001R018  | 91/02/25  |     | F  | 128  | 2048   |
|   20    1    | D001R019  | 91/02/25  |     | F  | 128  | 2048   |
|   21    1    | D001R020  | 91/02/25  |     | F  | 128  | 2048   |
|   22    1    | D001R021  | 91/02/25  |     | F  | 128  | 2048   |
|   23    1    | D001R022  | 91/02/25  |     | F  | 128  | 2048   |
 ------------------------------------------------------------------

--------------------------------------------------------


    ******************************************************
    *                                                    *
    *  VERIFY SECTION 5.2.1.1 Volume Identifier          *
    *                                                    *
    ******************************************************

Volume Identifier : "TAPE01"
 Check 1: the tape volume identifier, "TAPE01" is six characters.
 Check 2: the first character "T" is not a number.
 Check 3: the tape number, "01" starts at 01.
 Check 4: the tape number "01" is the first number.
```

```
 Check 5: all characters in "TAPE01" are limited to the ASCII
          numbers 0-9 and the upper-case letters.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *  VERIFY SECTION 5.1 File structure for transfer    *
    *                                                    *
    ******************************************************

Check 6: There is one declaration file, "D001".
Check 7: There exists at least one data file.
Check 8: The declaration file, "D001", does precede the data files.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *            READ THE DECLARATION FILE               *
    *                                                    *
    ******************************************************

rwmt -r -f d001 -rf d
    15 records read from tape file #1 into "D001".

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DECLARATION FILE     *
    *                                                    *
    ******************************************************

catf D001

srcsys: DSREDS Intergraph Workstation
srcdocid: MIL-STD-1840A preliminary Raster Test Suite
srcrelid: NONE
chglvl: ORIGINAL
dteisu: 19910226
dstsys: CALS Test Network Partner
dstdocid: MIL-STD-1840A preliminary Raster Test Suite
dstrelid: NONE
dtetrn: 19910226
dlvacc: NONE
filcnt: R22
ttlcls: Unclassified
doccls: Unclassified
doctyp: CTN Raster Reference Images
docttl: CTN Raster Test Suite

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *  VERIFY SECTION 5.2.1.3 Declaration File           *
    *                                                    *
    ******************************************************

 Check 9:  the declaration file, "D001", consists of sequential
           variable length records.
```

Check 10: the records are all of ANSI type D (variable).
Check 11: the maximum record length is 260 bytes.
Check 12: each block is 2048 bytes.

```
    ******************************************************
    *                                                    *
    * Section 5.1.1.1 Declaration File Name              *
    *                                                    *
    ******************************************************
```

Verifying Declaration File Name, "D001"

Check 13: "D001" is four characters in length.
Check 14: the first character of "D001" is a "D".
Check 15: the next three characters in "D001" are ASCII numbers between 001 to 999.

```
    ******************************************************
    *                                                    *
    * Section 5.1.1.2 Declaration File Content           *
    *                                                    *
    ******************************************************
```

Verifying the Contents of the Declaration File, "D001"

Record 1. - Source system (srcsys:).

"srcsys: DSREDS Intergraph Workstation"

Check 16: the "srcsys: " record is present.
Check 17: "DSREDS Intergraph Workstation" follows the "srcsys: " record.

Record 2. - Source system document identifier (srcdocid:).

"srcdocid: MIL-STD-1840A preliminary Raster Test Suite"

Check 18: the "srcdocid: " record is present.
Check 19: "MIL-STD-1840A preliminary Raster Test Suite" follows the "srcdocid: " record.

Record 3. - Source system related document identifier (srcrelid:).

"srcrelid: NONE"

Check 20: the "srcrelid: " record is present.
Check 21: the ASCII string "NONE" follows the "srcrelid: " record.

Record 4. - Highest revision and change level in the document (chglvl:).

"chglvl: ORIGINAL"

Check 22: the "chglvl: " record is present.
Check 23: the word "ORIGINAL" follows the record. No date was given.

Record 5. - Date of issue of the latest change to the document (dteisu:).

"dteisu: 19910226"

Check 24: the "dteisu: " record is present.
Check 25: a date, 19910226, is provided in YYYYMMDD format.

Record 6. - Destination system (dstsys:).

"dstsys: CALS Test Network Member"

Check 26: the "dstsys: " record is present.
Check 27: "CALS Test Network Member" follows the "dstsys: " record.

Record 7. - Destination system document identifier (dstdocid:).

"dstdocid: MIL-STD-1840A preliminary Raster Test Suite"

Check 28: the "dstdocid: " record is present.
Check 29: "MIL-STD-1840A preliminary Raster Test Suite" follows the "dstdocid: " record.

Record 8. - Destination system related document identifier (dstrelid:).

"dstrelid: NONE"

Check 30: the "dstrelid: " record is present.
Check 31: the ASCII string "NONE" follows the "dstrelid: " record.

Record 9. - Date of transfer (dtetrn:).

"dtetrn: 19910226"

Check 32: the "dtetrn: " record is present.
Check 33: the date, 19910226, in YYYYMMDD format follows the record.

Record 10. - Delivery accounting (dlvacc:).

"dlvacc: NONE"

Check 34: the "dlvacc: " record is present.
Check 35: the ASCII string "NONE" follows the "dlvacc: " record.

Record 11. - File count (filcnt:).

"filcnt: R22"

Check 36: the "filcnt: " record is present.
Check 37: the letter "R" immediately follows the record.
Check 38: the file count, 22, follows the "R" with no spaces between the count and the character.

Record 12. - Title Security Label (ttlcls:).

"ttlcls: Unclassified"

Check 39: the "ttlcls: " record is present.
Check 40: "Unclassified" follows the "ttlcls: " record.

Record 13. - Document Security Label (doccls:).

"doccls: Unclassified"

Check 41: the "doccls: " record is present.
Check 42: "Unclassified" follows the "doccls: " record.

Record 14. - Document Type (doctyp:).

"doctyp: CTN Raster Reference Images"

Check 43: the "doctyp: " record is present.
Check 44: "CTN Raster Reference Images" follows the "doctyp: " record.

Record 15. - Document Title (docttl:).

"docttl: CTN Raster Test Suite"

Check 45: the "docttl: " record is present.
Check 46: the ASCII string "CTN Raster Test Suite" follows the "docttl: " record.

****
* Section 5.1.3 Data File Name *
****

Verifying the Names of the 22 data files

"D001R001"
Check 47: "D001R001" is eight characters long.
Check 48: the first four characters of "D001R001" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R001" is the letter "R".
Check 50: the last three characters of "D001R001" is "001", a decimal number from "001" to "999".
Check 51: "D001R001"is the first data file for the document and correctly uses "001".

"D001R002"
Check 47: "D001R002" is eight characters long.
Check 48: the first four characters of "D001R002" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R002" is the letter "R".
Check 50: the last three characters of "D001R002" are "002", a decimal number from "001" to "999".
Check 51: "D001R002"is the second data file for the document and correctly uses "002".

"D001R003"
Check 47: "D001R003" is eight characters long.
Check 48: the first four characters of "D001R003" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R003" is the letter "R".
Check 50: the last three characters of "D001R003" are "003", a decimal number from "001" to "999".
Check 51: "D001R003"is the third data file for the document and correctly uses "003".

"D001R004"
Check 47: "D001R004" is eight characters long.
Check 48: the first four characters of "D001R004" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R004" is the letter "R".
Check 50: the last three characters of "D001R004" are "004", a decimal number from "001" to "999".
Check 51: "D001R004"is the fourth data file for the document and correctly uses "004".

"D001R005"
Check 47: "D001R005" is eight characters long.
Check 48: the first four characters of "D001R005" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R005" is the letter "R".
Check 50: the last three characters of "D001R005" are "005", a decimal number from "001" to "999".
Check 51: "D001R005"is the fifth data file for the document and correctly uses "005".

"D001R006"
Check 47: "D001R006" is eight characters long.
Check 48: the first four characters of "D001R006" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R006" is the letter "R".
Check 50: the last three characters of "D001R006" are "006", a decimal number from "001" to "999".
Check 51: "D001R006"is the sixth data file for the document and correctly uses "006".

"D001R007"
Check 47: "D001R007" is eight characters long.
Check 48: the first four characters of "D001R007" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R007" is the letter "R".
Check 50: the last three characters of "D001R007" are "007", a decimal number from "001" to "999".
Check 51: "D001R007"is the seventh data file for the document and correctly uses "007".

"D001R008"
Check 47: "D001R008" is eight characters long.
Check 48: the first four characters of "D001R008" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R008" is the letter "R".
Check 50: the last three characters of "D001R008" are "008", a decimal number from "001" to "999".
Check 51: "D001R008"is the eighth data file for the document and correctly uses "008".

"D001R009"
Check 47: "D001R009" is eight characters long.
Check 48: the first four characters of "D001R009" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R009" is the letter "R".
Check 50: the last three characters of "D001R009" are "009", a decimal number from "001" to "999".
Check 51: "D001R009"is the ninth data file for the document and correctly uses "009".

"D001R010"
Check 47: "D001R010" is eight characters long.
Check 48: the first four characters of "D001R010" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R010" is the letter "R".
Check 50: the last three characters of "D001R010" are "010", a decimal number from "001" to "999".
Check 51: "D001R010"is the tenth data file for the document and correctly uses "010".

"D001R011"
Check 47: "D001R011" is eight characters long.
Check 48: the first four characters of "D001R011" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R011" is the letter "R".
Check 50: the last three characters of "D001R011" are "011", a decimal number from "001" to "999".
Check 51: "D001R011"is the eleventh data file for the document and correctly uses "011".

"D001R012"
Check 47: "D001R012" is eight characters long.
Check 48: the first four characters of "D001R012" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R012" is the letter "R".
Check 50: the last three characters of "D001R012" are "012", a decimal number from "001" to "999".
Check 51: "D001R012"is the twelfth data file for the document and correctly uses "012".

"D001R013"
Check 47: "D001R013" is eight characters long.
Check 48: the first four characters of "D001R013" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R013" is the letter "R".
Check 50: the last three characters of "D001R013" are "013", a decimal number from "001" to "999".
Check 51: "D001R013"is the thirteenth data file for the document and correctly uses "013".

"D001R014"
Check 47: "D001R014" is eight characters long.
Check 48: the first four characters of "D001R014" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R014" is the letter "R".
Check 50: the last three characters of "D001R014" are "014", a decimal number from "001" to "999".
Check 51: "D001R014"is the fourteenth data file for the document and correctly uses "014".

"D001R015"
Check 47: "D001R015" is eight characters long.
Check 48: the first four characters of "D001R015" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R015" is the letter "R".
Check 50: the last three characters of "D001R015" are "015", a decimal number from "001" to "999".
Check 51: "D001R015"is the fifteenth data file for the document and correctly uses "015".

"D001R016"
Check 47: "D001R016" is eight characters long.
Check 48: the first four characters of "D001R016" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R016" is the letter "R".
Check 50: the last three characters of "D001R016" are "016", a decimal number from "001" to "999".
Check 51: "D001R016"is the sixteenth data file for the document and correctly uses "016".

"D001R017"
Check 47: "D001R017" is eight characters long.
Check 48: the first four characters of "D001R017" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R017" is the letter "R".
Check 50: the last three characters of "D001R017" are "017", a decimal number from "001" to "999".
Check 51: "D001R017"is the seventeenth data file for the document and correctly uses "017".

"D001R018"
Check 47: "D001R018" is eight characters long.
Check 48: the first four characters of "D001R018" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R018" is the letter "R".
Check 50: the last three characters of "D001R018" are "018", a decimal number from "001" to "999".
Check 51: "D001R018"is the eighteenth data file for the document and correctly uses "018".

"D001R019"
Check 47: "D001R019" is eight characters long.
Check 48: the first four characters of "D001R019" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R019" is the letter "R".
Check 50: the last three characters of "D001R019" are "019", a decimal number from "001" to "999".
Check 51: "D001R019"is the nineteenth data file for the document and correctly uses "019".

"D001R020"
Check 47: "D001R020" is eight characters long.
Check 48: the first four characters of "D001R020" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R020" is the letter "R".
Check 50: the last three characters of "D001R020" are "020", a decimal number from "001" to "999".
Check 51: "D001R020"is the twentieth data file for the document and correctly uses "020".

"D001R021"
Check 47: "D001R021" is eight characters long.
Check 48: the first four characters of "D001R021" are the same as the declaration file name, "D001".
Check 49: the fifth character of "D001R021" is the letter "R".
Check 50: the last three characters of "D001R021" are "021", a decimal number from "001" to "999".
Check 51: "D001R021"is the twenty-first data file for the document and correctly uses "021".

```
'D001R022"
 Check 47: "D001R022" is eight characters long.
 Check 48: the first four characters of "D001R022" are the same as
           the declaration file name, "D001".
 Check 49: the fifth character of "D001R022" is the letter "R".
 Check 50: the last three characters of "D001R022" are "022",
           a decimal number from "001" to "999".
 Check 51: "D001R022"is the twenty-second data file for the document
           and correctly uses "022".

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *           READ THE DATA FILES                      *
    *                                                    *
    ******************************************************

 rwmt -r -f 2 D001R001 -raw -rf f -rl 128 -bl 2048
    254 records read from tape file #2 into "D001R001".

 rwmt -r -f cur D001R002 -raw -rf f -rl 128 -bl 2048
   1162 records read from tape file #3 into "D001R002".

 rwmt -r -f cur D001R003 -raw -rf f -rl 128 -bl 2048
    283 records read from tape file #4 into "D001R003".

 rwmt -r -f cur D001R004 -raw -rf f -rl 128 -bl 2048
    585 records read from tape file #5 into "D001R004".

 rwmt -r -f cur D001R005 -raw -rf f -rl 128 -bl 2048
   3217 records read from tape file #6 into "D001R005".

 rwmt -r -f cur D001R006 -raw -rf f -rl 128 -bl 2048
      52 records read from tape file #7 into "D001R006".

 rwmt -r -f cur D001R007 -raw -rf f -rl 128 -bl 2048
      67 records read from tape file #8 into "D001R007".

 rwmt -r -f cur D001R008 -raw -rf f -rl 128 -bl 2048
     73 records read from tape file #9 into "D001R008".

 rwmt -r -f cur D001R009 -raw -rf f -rl 128 -bl 2048
     82 records read from tape file #10 into "D001R009".

 rwmt -r -f cur D001R010 -raw -rf f -rl 128 -bl 2048
    335 records read from tape file #11 into "D001R010".

 rwmt -r -f cur D001R011 -raw -rf f -rl 128 -bl 2048
   1046 records read from tape file #12 into "D001R011".

 rwmt -r -f cur D001R012 -raw -rf f -rl 128 -bl 2048
     729 records read from tape file #13 into "D001R012".

 rwmt -r -f cur D001R013 -raw -rf f -rl 128 -bl 2048
   3217 records read from tape file #14 into "D001R013".

 rwmt -r -f cur D001R014 -raw -rf f -rl 128 -bl 2048
     18 records read from tape file #15 into "D001R014".

 rwmt -r -f cur D001R015 -raw -rf f -rl 128 -bl 2048
      18 records read from tape file #16 into "D001R015".
```

```
 rwmt -r -f cur D001R016 -raw -rf f -rl 128 -bl 2048
     17 records read from tape file #17 into "D001R016".

 rwmt -r -f cur D001R017 -raw -rf f -rl 128 -bl 2048
    517 records read from tape file #18 into "D001R017".

 rwmt -r -f cur D001R018 -raw -rf f -rl 128 -bl 2048
   1628 records read from tape file #19 into "D001R018".

 rwmt -r -f cur D001R019 -raw -rf f -rl 128 -bl 2048
    514 records read from tape file #20 into "D001R019".

 rwmt -r -f cur D001R020 -raw -rf f -rl 128 -bl 2048
    161 records read from tape file #21 into "D001R020".

 rwmt -r -f cur D001R021 -raw -rf f -rl 128 -bl 2048
    239 records read from tape file #22 into "D001R021".

 rwmt -r -f cur D001R022 -raw -rf f -rl 128 -bl 2048
    918 records read from tape file #23 into "D001R022".
```

```
    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R001 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS1          18876001  000  BX      001 001UDCETN
dstdocid: CALS1          18876001  000  BX      001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 001728,002200
rdensty: 0200
notes:

cals2aud: normal completion
```

```
    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R001"
```

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS1 18876001 000 BX 001 001UDCETN"

Check 56: the "srcdocid: " record is present.
Check 57: "CALS1 18876001 000 BX 001 001UDCETN" follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS1 18876001 000 BX 001 001UDCETN"

Check 58: the "dstdocid: " record is present.
Check 59: "CALS1 18876001 000 BX 001 001UDCETN" follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

Check 60: the "txtfilid: " record is present.
Check 61: the ASCII string "NONE" follows the "txtfilid: " record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

Check 62: the "figid: " record is present.
Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

```
Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 001728,002200"

 Check 72: the "rpelcnt: " record is present.
 Check 73: "001728,002200" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R001" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R001" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R001", with the block
           padded to the appropriate size.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R002 -h

cals2aud Conversion Program Version 1.0

srcdocid: CALS10          18876001  000  BX      001 001UDCETN
dstdocid: CALS10          18876001  000  BX      001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 006800,008800
```

```
rdensty: 0200
notes:

cals2aud: normal completion

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R002"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS10         18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS10         18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS10         18876001  000  BX     001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS10         18876001  000  BX     001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

 Check 64: the "srcgph: " record is present.
 Check 65: "none"  follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

 Check 66: the "doccls: " record is present.
 Check 67: the ASCII string "NONE" follows the "doccls: " record.
```

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 006800,008800"

Check 72: the "rpelcnt: " record is present.
Check 73: "006800,008800" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

Check 74: the "rdensty: " record is present.
Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

Check 76: the "notes: " record is present.
Check 77: Nothing follows the "notes: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE" when no relevant data is available.

****
* *
* Section 5.2.1.6 Raster files *
* *
****

Check 52: all the raster file records in "D001R002" are written with 128 byte ANSI type F fixed-length records.
Check 53: the header block is of length 2048 bytes.
Check 54: the second and all succeeding physical blocks of "D001R002" contain the image data encoded in raster CCITT group 4 code.
Check 55: all the data header records are written in the first physical block of "D001R002", with the block padded to the appropriate size.

```
    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R003 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS11          18876001  000  BX     001 001UDCETN
dstdocid: CALS11          18876001  000  BX     001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 002480,003616
rdensty: 0200
notes:

cals2aud: normal completion

------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R003"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS11         18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS11         18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS11         18876001  000  BX     001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS11         18876001  000  BX     001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.
```

Record 4. - Figure identifier (figid:).

"figid: NONE"

Check 62: the "figid: " record is present.
Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 002480,003616"

Check 72: the "rpelcnt: " record is present.
Check 73: "002480,003616" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

Check 74: the "rdensty: " record is present.
Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

Check 76: the "notes: " record is present.
Check 77: Nothing follows the "notes: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE"
when no relevant data is available.

```
    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************
```

Check 52: all the raster file records in "D001R003" are written with 128 byte ANSI type F fixed-length records.
Check 53: the header block is of length 2048 bytes.
Check 54: the second and all succeeding physical blocks of "D001R003" contain the image data encoded in raster CCITT group 4 code.
Check 55: all the data header records are written in the first physical block of "D001R003", with the block padded to the appropriate size.

```
    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************
```

```
cals2aud D001R004 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS12          18876001  000  BX      001 001UDCETN
dstdocid: CALS12          18876001  000  BX      001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 004848,006800
rdensty: 0200
notes:

cals2aud: normal completion
```

```
    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R004"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS12          18876001  000  BX      001 001UDCETN"
```

Check 56: the "srcdocid: " record is present.
Check 57: "CALS12 18876001 000 BX 001 001UDCETN" follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS12 18876001 000 BX 001 001UDCETN"

Check 58: the "dstdocid: " record is present.
Check 59: "CALS12 18876001 000 BX 001 001UDCETN" follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

Check 60: the "txtfilid: " record is present.
Check 61: the ASCII string "NONE" follows the "txtfilid: " record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

Check 62: the "figid: " record is present.
Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 004848,006800"

Check 72: the "rpelcnt: " record is present.
Check 73: "004848,006800" follow the "rpelcnt: " record.

```
Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R004" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R004" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R004", with the block
           padded to the appropriate size.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R005 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS14          18876001  000  BX      001 001UDCETN
dstdocid: CALS14          18876001  000  BX      001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 006848,028600
rdensty: 0200
notes:

cals2aud: normal completion

-------------------------------------------------------
```

```
     ******************************************************
     *                                                    *
     * Section 5.1.4.4 Data file header records.          *
     *                                                    *
     ******************************************************

 Verifying the data file header records.

 "D001R005"

 Record 1. - Source system document identifier (srcdocid:).

 "srcdocid: CALS14          18876001  000  BX     001 001UDCETN"

  Check 56: the "srcdocid: " record is present.
  Check 57: "CALS14          18876001  000  BX     001 001UDCETN"
            follows the "srcdocid: " record.

 Record 2. - Destination system document identifier (dstdocid:).

 "dstdocid: CALS14          18876001  000  BX     001 001UDCETN"

  Check 58: the "dstdocid: " record is present.
  Check 59: "CALS14          18876001  000  BX     001 001UDCETN"
            follows the "dstdocid: " record.

 Record 3. - Text file identifier (txtfilid:).

 "txtfilid: NONE"

  Check 60: the "txtfilid: " record is present.
  Check 61: the ASCII string "NONE" follows the "txtfilid: "
            record.

 Record 4. - Figure identifier (figid:).

 "figid: NONE"

  Check 62: the "figid: " record is present.
  Check 63: the ASCII string "NONE" follows the "figid: " record.

 Record 5. - Source system graphics filename (srcgph:).

 "srcgph: none"

  Check 64: the "srcgph: " record is present.
  Check 65: "none"  follows the "srcgph: " record.
 ERROR! MIL-STD-1840A specifies the upper case string "NONE".

 Record 6. - Data file security label (doccls:).

 "doccls: NONE"

  Check 66: the "doccls: " record is present.
  Check 67: the ASCII string "NONE" follows the "doccls: " record.

 Record 7. - Raster data type (rtype:).

 "rtype: 1"

  Check 68: the "rtype: " record is present.
  Check 69: the character "1" follows the "rtype: " record.
```

```
Record 8. - Raster image orientation (rorient:).

'rorient: 090,270"

 Check 70: the "rorient: " record is present.
 Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 006848,028600"

 Check 72: the "rpelcnt: " record is present.
 Check 73: "006848,028600" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R005" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R005" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R005", with the block
           padded to the appropriate size.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R006 -h

cals2aud Conversion Program Version 1.0
```

```
srcdocid: CALS15          18876001  000  BX     001 001UDCETN
dstdocid: CALS15          18876001  000  BX     001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 002208,001656
rdensty: 0200
notes:

cals2aud: normal completion

-----------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R006"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS15          18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS15          18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS15          18876001  000  BX     001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS15          18876001  000  BX     001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.


Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.
```

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 002208,001656"

Check 72: the "rpelcnt: " record is present.
Check 73: "002208,001656" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

Check 74: the "rdensty: " record is present.
Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

Check 76: the "notes: " record is present.
Check 77: Nothing follows the "notes: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE"
when no relevant data is available.

```
    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R006" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R006" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R006", with the block
           padded to the appropriate size.

------------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R007 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS16          18876001  000  BX     001 001UDCETN
dstdocid: CALS16          18876001  000  BX     001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 002208,003312
rdensty: 0200
notes:

cals2aud: normal completion

------------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R007"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS16          18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS16          18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.
```

Record 2. - Destination system document identifier (dstdocid:).

'dstdocid: CALS16 18876001 000 BX 001 001UDCETN"

Check 58: the "dstdocid: " record is present.
Check 59: "CALS16 18876001 000 BX 001 001UDCETN" follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

Check 60: the "txtfilid: " record is present.
Check 61: the ASCII string "NONE" follows the "txtfilid: " record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

Check 62: the "figid: " record is present.
Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 002208,003312"

Check 72: the "rpelcnt: " record is present.
Check 73: "002208,003312" follow the "rpelcnt: " record.

```
Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R007" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R007" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R007", with the block
           padded to the appropriate size.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R008 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS17          18876001  000  BX      001 001UDCETN
dstdocid: CALS17          18876001  000  BX      001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 003312,004680
rdensty: 0200
notes:

cals2aud: normal completion

-------------------------------------------------------
```

```
    ****************************************************
    *                                                  *
    * Section 5.1.4.4 Data file header records.        *
    *                                                  *
    ****************************************************

Verifying the data file header records.

"D001R008"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS17         18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS17         18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS17         18876001  000  BX     001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS17         18876001  000  BX     001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

 Check 64: the "srcgph: " record is present.
 Check 65: "none"  follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

 Check 66: the "doccls: " record is present.
 Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

 Check 68: the "rtype: " record is present.
 Check 69: the character "1" follows the "rtype: " record.
```

```
Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

 Check 70: the "rorient: " record is present.
 Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 003312,004680"

 Check 72: the "rpelcnt: " record is present.
 Check 73: "003312,004680" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R008" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R008" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R008", with the block
           padded to the appropriate size.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R009 -h

cals2aud Conversion Program Version 1.0
```

```
srcdocid: CALS18          18876001  000  BX      001 001UDCETN
dstdocid: CALS18          18876001  000  BX      001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 004688,006624
rdensty: 0200
notes:

cals2aud: normal completion

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R009"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS18         18876001  000  BX      001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS18         18876001  000  BX      001 001UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS18         18876001  000  BX      001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS18         18876001  000  BX      001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.
```

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 004688,006624"

Check 72: the "rpelcnt: " record is present.
Check 73: "004688,006624" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

Check 74: the "rdensty: " record is present.
Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

Check 76: the "notes: " record is present.
Check 77: Nothing follows the "notes: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE"
when no relevant data is available.

```
    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R009" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R009" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R009", with the block
           padded to the appropriate size.

------------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R010 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS2          18876001  000  BX     001 001UDCETN
dstdocid: CALS2          18876001  000  BX     001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 002240,003400
rdensty: 0200
notes:

cals2aud: normal completion

------------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R010"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS2          18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS2          18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.
```

```
Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS2          18876001  000  BX     001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS2          18876001  000  BX     001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

 Check 64: the "srcgph: " record is present.
 Check 65: "none"  follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

 Check 66: the "doccls: " record is present.
 Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

 Check 68: the "rtype: " record is present.
 Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

 Check 70: the "rorient: " record is present.
 Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 0012240,003400"

 Check 72: the "rpelcnt: " record is present.
 Check 73: "002240,003400" follow the "rpelcnt: " record.
```

Record 10. - Raster image density (rdensty:).

'rdensty: 0200"

Check 74: the "rdensty: " record is present.
Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

Check 76: the "notes: " record is present.
Check 77: Nothing follows the "notes: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE" when no relevant data is available.

```
*****************************************************
*                                                   *
* Section 5.2.1.6 Raster files                      *
*                                                   *
*****************************************************
```

Check 52: all the raster file records in "D001R010" are written with 128 byte ANSI type F fixed-length records.
Check 53: the header block is of length 2048 bytes.
Check 54: the second and all succeeding physical blocks of "D001R010" contain the image data encoded in raster CCITT group 4 code.
Check 55: all the data header records are written in the first physical block of "D001R010", with the block padded to the appropriate size.

```
*****************************************************
*                                                   *
*     PRINT THE CONTENTS OF THE DATA HEADER FILES   *
*                                                   *
*****************************************************
```

```
cals2aud D001R011 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS3          18876001  000  BX     001 001UDCETN
dstdocid: CALS3          18876001  000  BX     001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 003456,004400
rdensty: 0200
notes:

cals2aud: normal completion
```

```
    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R011"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS3          18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS3          18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS3          18876001  000  BX     001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS3          18876001  000  BX     001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

 Check 64: the "srcgph: " record is present.
 Check 65: "none"  follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

 Check 66: the "doccls: " record is present.
 Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

 Check 68: the "rtype: " record is present.
 Check 69: the character "1" follows the "rtype: " record.
```

```
Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

 Check 70: the "rorient: " record is present.
 Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 03456,004400"

 Check 72: the "rpelcnt: " record is present.
 Check 73: "03456,004400" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R011" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R011" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R011", with the block
           padded to the appropriate size.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R012 -h

cals2aud Conversion Program Version 1.0
```

```
srcdocid: CALS4          18876001  000  BX     001 001UDCETN
dstdocid: CALS4          18876001  000  BX     001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 004416,006800
rdensty: 0200
notes:

cals2aud: normal completion

-----------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R012"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS4          18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS4          18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS4          18876001  000  BX     001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS4          18876001  000  BX     001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.
```

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: "the ASCII string NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 004416,006800"

Check 72: the "rpelcnt: " record is present.
Check 73: "004416,006800" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

Check 74: the "rdensty: " record is present.
Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

Check 76: the "notes: " record is present.
Check 77: Nothing follows the "notes: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE"
when no relevant data is available.

```
    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R012" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R012" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R012", with the block
           padded to the appropriate size.

------------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R013 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS5          18876001  000  BX     001 001UDCETN
dstdocid: CALS5          18876001  000  BX     001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 006848,008800
rdensty: 0200
notes:

cals2aud: normal completion

------------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R013"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS5          18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS5          18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.
```

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS5 18876001 000 BX 001 001UDCETN"

Check 58: the "dstdocid: " record is present.
Check 59: "CALS5 18876001 000 BX 001 001UDCETN" follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

Check 60: the "txtfilid: " record is present.
Check 61: the ASCII string "NONE" follows the "txtfilid: " record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

Check 62: the "figid: " record is present.
Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 001728, 002200"

Check 72: the "rpelcnt: " record is present.
Check 73: "001728, 002200" follow the "rpelcnt: " record.

```
Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R013" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R013" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R013", with the block
           padded to the appropriate size.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R014 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS6          18876001  000  BX     001 001UDCETN
dstdocid: CALS6          18876001  000  BX     001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 000128,00128
rdensty: 0200
notes:

cals2aud: normal completion

-------------------------------------------------------
```

```
**************************************************
*                                                *
* Section 5.1.4.4 Data file header records.      *
*                                                *
**************************************************

Verifying the data file header records.

"D001R014"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS6          18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS6          18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS6          18876001  000  BX     001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS6          18876001  000  BX     001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

 Check 64: the "srcgph: " record is present.
 Check 65: "none"  follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

 Check 66: the "doccls: " record is present.
 Check 67: the ASCII string "NONE" follows the "doccls: " record.
```

```
Record 7. - Raster data type (rtype:).

"rtype: 1"

 Check 68: the "rtype: " record is present.
 Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

 Check 70: the "rorient: " record is present.
 Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 000128,000128"

 Check 72: the "rpelcnt: " record is present.
 Check 73: "000128, 000128" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R014" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R014" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R014", with the block
           padded to the appropriate size.

-------------------------------------------------------
```

```
     ******************************************************
     *                                                    *
     *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
     *                                                    *
     ******************************************************

cals2aud D001R015 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS7          18876001  000  BX      001 001UDCETN
dstdocid: CALS7          18876001  000  BX      001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 003600,000056
rdensty: 0200
notes:

cals2aud: normal completion

------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R015"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS7          18876001  000  BX      001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS7          18876001  000  BX      001 001UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS7          18876001  000  BX      001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS7          18876001  000  BX      001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.
```

```
Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

 Check 64: the "srcgph: " record is present.
 Check 65: "none"  follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

 Check 66: the "doccls: " record is present.
 Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

 Check 68: the "rtype: " record is present.
 Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

 Check 70: the "rorient: " record is present.
 Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 003600,000056"

 Check 72: the "rpelcnt: " record is present.
 Check 73: "003600,000056" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------
```

```
    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************
```

Check 52: all the raster file records in "D001R015" are written with 128 byte ANSI type F fixed-length records.
Check 53: the header block is of length 2048 bytes.
Check 54: the second and all succeeding physical blocks of "D001R015" contain the image data encoded in raster CCITT group 4 code.
Check 55: all the data header records are written in the first physical block of "D001R015", with the block padded to the appropriate size.

```
    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************
```

```
cals2aud D001R016 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS8          18876001  000  BX      001 001UDCETN
dstdocid: CALS8          18876001  000  BX      001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 003600,000026
rdensty: 0200
notes:

cals2aud: normal completion
```

```
    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R016"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS8          18876001  000  BX      001 001UDCETN"
```

Check 56: the "srcdocid: " record is present.
Check 57: "CALS8 18876001 000 BX 001 001UDCETN" follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS8 18876001 000 BX 001 001UDCETN"

Check 58: the "dstdocid: " record is present.
Check 59: "CALS8 18876001 000 BX 001 001UDCETN" follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

Check 60: the "txtfilid: " record is present.
Check 61: the ASCII string "NONE" follows the "txtfilid: " record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

Check 62: the "figid: " record is present.
Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 003600,000026"

Check 72: the "rpelcnt: " record is present.
Check 73: "003600,000026" follow the "rpelcnt: " record.

```
Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R016" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R016" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R016", with the block
           padded to the appropriate size.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R017 -h

cals2aud Conversion Program Version 1.0


srcdocid: CALS9          18876001  000  BX      001 001UDCETN
dstdocid: CALS9          18876001  000  BX      001 001UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 007040,009601
rdensty: 0200
notes:

cals2aud: normal completion

-------------------------------------------------------
```

```
    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R017"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: CALS9          18876001  000  BX     001 001UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "CALS9          18876001  000  BX     001 001UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: CALS9          18876001  000  BX     001 001UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "CALS9          18876001  000  BX     001 001UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

 Check 64: the "srcgph: " record is present.
 Check 65: "none"  follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

 Check 66: the "doccls: " record is present.
 Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

 Check 68: the "rtype: " record is present.
 Check 69: the character "1" follows the "rtype: " record.
```

```
Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

 Check 70: the "rorient: " record is present.
 Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 007040,009601"

 Check 72: the "rpelcnt: " record is present.
 Check 73: "0017040,009601" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R017" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R017" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R017", with the block
           padded to the appropriate size.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R018 -h

cals2aud Conversion Program Version 1.0
```

```
srcdocid: 10231737       18876001 R004  AO     001 004UDCETN
dstdocid: 10231737       18876001 R004  AO     001 004UDCETN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 007168,009200
rdensty: 0200
notes:

cals2aud: normal completion

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R018"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: 10231737       18876001 R004  AO     001 004UDCETN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "10231737       18876001 R004  AO     001 004UDCETN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: 10231737       18876001 R004  AO     001 004UDCETN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "10231737       18876001 R004  AO     001 004UDCETN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.
```

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 007168,009200"

Check 72: the "rpelcnt: " record is present.
Check 73: "007168,009200" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

Check 74: the "rdensty: " record is present.
Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

Check 76: the "notes: " record is present.
Check 77: Nothing follows the "notes: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE"
when no relevant data is available.

```
    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R018" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R018" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R018", with the block
           padded to the appropriate size.

------------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R019 -h

cals2aud Conversion Program Version 1.0


srcdocid: 10236678       18876001 B002  BA     001 002UDCCTN
dstdocid: 10236678       18876001 B002  BA     001 002UDCCTN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 003424,004362
rdensty: 0200
notes:

cals2aud: normal completion

------------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R019"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: 10236678       18876001 B002  BA     001 002UDCCTN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "10236678       18876001 B002  BA     001 002UDCCTN"
           follows the "srcdocid: " record.
```

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: 10236678 18876001 B002 BA 001 002UDCCTN"

Check 58: the "dstdocid: " record is present.
Check 59: "10236678 18876001 B002 BA 001 002UDCCTN" follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

Check 60: the "txtfilid: " record is present.
Check 61: the ASCII string "NONE" follows the "txtfilid: " record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

Check 62: the "figid: " record is present.
Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 003424,004362"

Check 72: the "rpelcnt: " record is present.
Check 73: "003424,004362" follow the "rpelcnt: " record.

```
Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R019" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R019" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R019", with the block
           padded to the appropriate size.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R020 -h

cals2aud Conversion Program Version 1.0


srcdocid: 11508910/01    18876001 A000  BX      001 499UDCATN
dstdocid: 11508910/01    18876001 A000  BX      001 499UDCATN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 002640,001929
rdensty: 0200
notes:

cals2aud: normal completion

-------------------------------------------------------
```

```
    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R020"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: 11508910/01    18876001 A000  BX     001 499UDCATN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "11508910/01    18876001 A000  BX     001 499UDCATN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: 11508910/01    18876001 A000  BX     001 499UDCATN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "11508910/01    18876001 A000  BX     001 499UDCATN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

 Check 64: the "srcgph: " record is present.
 Check 65: "none"  follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

 Check 66: the "doccls: " record is present.
 Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

 Check 68: the "rtype: " record is present.
 Check 69: the character "1" follows the "rtype: " record.
```

```
Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

 Check 70: the "rorient: " record is present.
 Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 002640,001929"

 Check 72: the "rpelcnt: " record is present.
 Check 73: "02640,001929" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R020" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R020" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R020", with the block
           padded to the appropriate size.

-------------------------------------------------------


    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R021 -h

cals2aud Conversion Program Version 1.0
```

```
srcdocid: 13035492        18876001   001    B      001 001UDCBTN
dstdocid: 13035492        18876001   001    B      001 001UDCBTN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 002320,003404
rdensty: 0200
notes:

cals2aud: normal completion

-------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R021"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: 13035492       18876001   001    B      001 001UDCBTN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "13035492       18876001   001    B      001 001UDCBTN"
           follows the "srcdocid: " record.

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: 13035492       18876001   001    B      001 001UDCBTN"

 Check 58: the "dstdocid: " record is present.
 Check 59: "13035492       18876001   001    B      001 001UDCBTN"
           follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

 Check 60: the "txtfilid: " record is present.
 Check 61: the ASCII string "NONE" follows the "txtfilid: "
           record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

 Check 62: the "figid: " record is present.
 Check 63: the ASCII string "NONE" follows the "figid: " record.
```

```
Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

 Check 64: the "srcgph: " record is present.
 Check 65: "none"  follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

 Check 66: the "doccls: " record is present.
 Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

 Check 68: the "rtype: " record is present.
 Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

 Check 70: the "rorient: " record is present.
 Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 002320,003404"

 Check 72: the "rpelcnt: " record is present.
 Check 73: "002320,003404" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

 Check 74: the "rdensty: " record is present.
 Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

 Check 76: the "notes: " record is present.
 Check 77: Nothing follows the "notes: " record.
 ERROR!  MIL-STD-1840A specifies the upper case string "NONE"
         when no relevant data is available.

-------------------------------------------------------
```

```
    ******************************************************
    *                                                    *
    * Section 5.2.1.6 Raster files                       *
    *                                                    *
    ******************************************************

 Check 52: all the raster file records in "D001R021" are written
           with 128 byte ANSI type F fixed-length records.
 Check 53: the header block is of length 2048 bytes.
 Check 54: the second and all succeeding physical blocks of
           "D001R021" contain the image data encoded in raster
           CCITT group 4 code.
 Check 55: all the data header records are written in the
           first physical block of "D001R021", with the block
           padded to the appropriate size.

------------------------------------------------------------

    ******************************************************
    *                                                    *
    *     PRINT THE CONTENTS OF THE DATA HEADER FILES    *
    *                                                    *
    ******************************************************

cals2aud D001R022 -h

cals2aud Conversion Program Version 1.0


srcdocid: 13160143       18876001  001  AI     001 001UDCDTN
dstdocid: 13160143       18876001  001  AI     001 001UDCDTN
txtfilid: NONE
figid: NONE
srcgph: none
doccls: NONE
rtype: 1
rorient: 090,270
rpelcnt: 005616,008640
rdensty: 0200
notes:

cals2aud: normal completion

------------------------------------------------------------

    ******************************************************
    *                                                    *
    * Section 5.1.4.4 Data file header records.          *
    *                                                    *
    ******************************************************

Verifying the data file header records.

"D001R022"

Record 1. - Source system document identifier (srcdocid:).

"srcdocid: 13160143       18876001  001  AI     001 001UDCDTN"

 Check 56: the "srcdocid: " record is present.
 Check 57: "13160143       18876001  001  AI     001 001UDCDTN"
           follows the "srcdocid: " record.
```

Record 2. - Destination system document identifier (dstdocid:).

"dstdocid: 13160143 18876001 001 AI 001 001UDCDTN"

Check 58: the "dstdocid: " record is present.
Check 59: "13160143 18876001 001 AI 001 001UDCDTN" follows the "dstdocid: " record.

Record 3. - Text file identifier (txtfilid:).

"txtfilid: NONE"

Check 60: the "txtfilid: " record is present.
Check 61: the ASCII string "NONE" follows the "txtfilid: " record.

Record 4. - Figure identifier (figid:).

"figid: NONE"

Check 62: the "figid: " record is present.
Check 63: the ASCII string "NONE" follows the "figid: " record.

Record 5. - Source system graphics filename (srcgph:).

"srcgph: none"

Check 64: the "srcgph: " record is present.
Check 65: "none" follows the "srcgph: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE".

Record 6. - Data file security label (doccls:).

"doccls: NONE"

Check 66: the "doccls: " record is present.
Check 67: the ASCII string "NONE" follows the "doccls: " record.

Record 7. - Raster data type (rtype:).

"rtype: 1"

Check 68: the "rtype: " record is present.
Check 69: the character "1" follows the "rtype: " record.

Record 8. - Raster image orientation (rorient:).

"rorient: 090,270"

Check 70: the "rorient: " record is present.
Check 71: "090,270" follow the "rorient: " record.

Record 9. - Raster image pel count (rpelcnt:).

"rpelcnt: 005616,008640"

Check 72: the "rpelcnt: " record is present.
Check 73: "005616,008640" follow the "rpelcnt: " record.

Record 10. - Raster image density (rdensty:).

"rdensty: 0200"

Check 74: the "rdensty: " record is present.
Check 75: "0200" follows the "rdensty: " record.

Record 11. - Notes (notes:).

"notes: "

Check 76: the "notes: " record is present.
Check 77: Nothing follows the "notes: " record.
ERROR! MIL-STD-1840A specifies the upper case string "NONE" when no relevant data is available.

```
**************************************************
*                                                *
* Section 5.2.1.6 Raster files                   *
*                                                *
**************************************************
```

Check 52: all the raster file records in "D001R022" are written with 128 byte ANSI type F fixed-length records.
Check 53: the header block is of length 2048 bytes.
Check 54: the second and all succeeding physical blocks of "D001R022" contain the image data encoded in raster CCITT group 4 code.
Check 55: all the data header records are written in the first physical block of "D001R022", with the block padded to the appropriate size.

```
*****************************************************************
*                                                               *
*                  MIL-R-28002 VALIDATION                       *
*                                                               *
*  The raster files are tested for adherence to the             *
*  MIL-R-28002 standard as documented in                        *
*           MIL-R-28002, 20 December 1988                       *
*           Military Specification                              *
*           Raster Graphics Representation in Binary Format,    *
*               Requirements For                                *
*                                                               *
*                                                               *
*****************************************************************

RASTER FILE : "D001R001"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R001 D001R001.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 001728,002200"

 Check 5: the dimensions "001728,002200" are two positive integers.
 Check 6: the actual image width is 1728.
 Check 7: the actual image height is 2200.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

 Check 9: the width, 1728, conforms to recommended A size values.
 Check 10: the height, 2200, conforms to recommended A size values.

------------------------------------------------------------

RASTER FILE : "D001R002"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R002 D001R002.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 006800,008800"

 Check 5: the dimensions "006800,008800" are two positive integers.
 Check 6: the actual image width is 6800.
 Check 7: the actual image height is 8800.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 6800, does not conform to recommended values.
 Check 10: the height, 8800, conforms to recommended E size values.

------------------------------------------------------

RASTER FILE : "D001R003"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R003 D001R003.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 002480,003616"

 Check 5: the dimensions "002480,003616" are two positive integers.
 Check 6: the actual image width is 2480.
 Check 7: the actual image height is 3616.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 2480, does not conform to recommended values.
WARNING!
 Check 10: the height, 3616, does not conform to recommended values.

-------------------------------------------------------

RASTER FILE : "D001R004"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R004 D001R004.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 004848,006800"

 Check 5: the dimensions "004848,006800" are two positive integers.
 Check 6: the actual image width is 4848.
 Check 7: the actual image height is 6800.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 4848, does not conform to recommended values.
 Check 10: the height, 6800, conforms to recommended D size values.

------------------------------------------------------

RASTER FILE : "D001R005"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R005 D001R005.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 006848,028600"

 Check 5: the dimensions "006848,028600" are two positive integers.
 Check 6: the actual image width is 6848.
 Check 7: the actual image height is 28600.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

 Check 9: the width, 6848, conforms to recommended E,J size values.
 Check 10: the height, 28600, conforms to recommended K size values.

------------------------------------------------------------

RASTER FILE : "D001R006"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R006 D001R006.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 002208,001656"

 Check 5: the dimensions "002208,001656" are two positive integers.
 Check 6: the actual image width is 2208.
 Check 7: the actual image height is 1656.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 2208, does not conform to recommended values.
WARNING!
 Check 10: the height, 1656, does not conform to recommended values.

--------------------------------------------------------

RASTER FILE : "D001R007"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R007 D001R007.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 002208,003312"

 Check 5: the dimensions "002208,003312" are two positive integers.
 Check 6: the actual image width is 2208.
 Check 7: the actual image height is 3312.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 2208, does not conform to recommended values.
 Check 10: the height, 3312, conforms to recommended A3 size values.

------------------------------------------------------

RASTER FILE : "D001R008"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R008 D001R008.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 003312,004680"

 Check 5: the dimensions "003312,004680" are two positive integers.
 Check 6: the actual image width is 3312.
 Check 7: the actual image height is 4680.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************
```

Check 9: the width, 3312, conforms to recommended A2 size values.
Check 10: the height, 4680, conforms to recommended A2 size values.

RASTER FILE : "D001R009"

```
    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************
```

Verifying data file content

cals2aud D001R009 D001R009.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

Check 1: compressed data conforms to CCITT Group IV recommendations.

```
    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************
```

"rtype: 1"

Check 2: data is of type I.

"rorient: 090,270"

Check 3: the pel path "090" is a permissible value.
Check 4: the line progression "270" is a permissible value.

"rpelcnt: 004688,006624"

Check 5: the dimensions "004688,006624" are two positive integers.
Check 6: the actual image width is 4688.
Check 7: the actual image height is 6624.

"rdensty: 0200"

Check 8: the raster image density is 200.

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 4688, does not conform to recommended values.
WARNING!
 Check 10: the height, 6624, does not conform to recommended values.

------------------------------------------------------------

RASTER FILE : "D001R010"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R010 D001R010.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 002240,003400"

 Check 5: the dimensions "002240,003400" are two positive integers.
 Check 6: the actual image width is 2240.
 Check 7: the actual image height is 3400.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************
```

Check 9: the width, 2240, conforms to recommended B size values.
Check 10: the height, 3400, conforms to recommended B size values.

RASTER FILE : "D001R011"

```
    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************
```

Verifying data file content

cals2aud D001R011 D001R011.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

Check 1: compressed data conforms to CCITT Group IV recommendations.

```
    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************
```

"rtype: 1"

Check 2: data is of type I.

"rorient: 090,270"

Check 3: the pel path "090" is a permissible value.
Check 4: the line progression "270" is a permissible value.

"rpelcnt: 003456,004400"

Check 5: the dimensions "003456,004400" are two positive integers.
Check 6: the actual image width is 3456.
Check 7: the actual image height is 4400.

"rdensty: 0200"

Check 8: the raster image density is 200.

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

 Check 9: the width, 3456, conforms to recommended C size values.
 Check 10: the height, 4400, conforms to recommended C size values.

------------------------------------------------------

RASTER FILE : "D001R012"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R012 D001R012.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 004416,006800"

 Check 5: the dimensions "004416,006800" are two positive integers.
 Check 6: the actual image width is 4416.
 Check 7: the actual image height is 6800.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

 Check 9: the width, 4416, conforms to recommended D size values.
 Check 10: the height, 6800, conforms to recommended D size values.

------------------------------------------------------------

RASTER FILE : "D001R013"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R013 D001R013.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 006848,008800"

 Check 5: the dimensions "006848,008800" are two positive integers.
 Check 6: the actual image width is 6848.
 Check 7: the actual image height is 8800.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

 Check 9: the width, 6848, conforms to recommended E,J size values.
 Check 10: the height, 8800, conforms to recommended E size values.

------------------------------------------------------------

RASTER FILE : "D001R014"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R014 D001R014.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 000128,00128"

 Check 5: the dimensions "000128,000128" are two positive integers.
 Check 6: the actual image width is 128.
 Check 7: the actual image height is 128.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 128, does not conform to recommended values.
WARNING!
 Check 10: the height, 128, does not conform to recommended values.

------------------------------------------------------

RASTER FILE : "D001R015"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R015 D001R015.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 003600,000056"

 Check 5: the dimensions "003600,000056" are two positive integers.
 Check 6: the actual image width is 3600.
 Check 7: the actual image height is 56.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 3600, does not conform to recommended values.
WARNING!
 Check 10: the height, 56, does not conform to recommended values.

------------------------------------------------------

RASTER FILE : "D001R016"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R016 D001R016.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 003600,000026"

 Check 5: the dimensions "003600,000026" are two positive integers.
 Check 6: the actual image width is 3600.
 Check 7: the actual image height is 26.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 3600, does not conform to recommended values.
WARNING!
 Check 10: the height, 26, does not conform to recommended values.

------------------------------------------------------

RASTER FILE : "D001R017"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R017 D001R017.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 007040,009601"

 Check 5: the dimensions "007040,009601" are two positive integers.
 Check 6: the actual image width is 7040.
 Check 7: the actual image height is 9601.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 7040, does not conform to recommended values.
WARNING!
 Check 10: the height, 9601, does not conform to recommended values.

------------------------------------------------------

RASTER FILE : "D001R018"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R018 D001R018.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 007168,009200"

 Check 5: the dimensions "007168,009200" are two positive integers.
 Check 6: the actual image width is 7168.
 Check 7: the actual image height is 9200.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
     ******************************************************
     *                                                    *
     * Section 6.3.2 Scanlines for engineering drawings   *
     *                                                    *
     ******************************************************

WARNING!
 Check 9: the width, 7168, does not conform to recommended values.
WARNING!
 Check 10: the height, 9200, does not conform to recommended values.

-------------------------------------------------------

RASTER FILE : "D001R019"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R019 D001R019.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 003424,004362"

 Check 5: the dimensions "003424,004362" are two positive integers.
 Check 6: the actual image width is 3424.
 Check 7: the actual image height is 4362.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 3424, does not conform to recommended values.
WARNING!
 Check 10: the height, 4362, does not conform to recommended values.

------------------------------------------------------

RASTER FILE : "D001R020"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *              4 Encoding.                           *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R020 D001R020.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 002640,001929"

 Check 5: the dimensions "002640,001929" are two positive integers.
 Check 6: the actual image width is 2640.
 Check 7: the actual image height is 1929.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 2640, does not conform to recommended values.
WARNING!
 Check 10: the height, 1929, does not conform to recommended values.

------------------------------------------------------------

RASTER FILE : "D001R021"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R021 D001R021.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 002320,003404"

 Check 5: the dimensions "002320,003404" are two positive integers.
 Check 6: the actual image width is 2320.
 Check 7: the actual image height is 3404.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 2320, does not conform to recommended values.
WARNING!
 Check 10: the height, 3404, does not conform to recommended values.

------------------------------------------------------

RASTER FILE : "D001R022"

    ******************************************************
    *                                                    *
    * Section 3.2 Verify CCITT Recommendation T.6 Group  *
    *             4 Encoding.                            *
    *                                                    *
    ******************************************************

Verifying data file content

cals2aud D001R022 D001R022.PIC

cals2aud Conversion Program Version 1.0

cals2aud: normal completion

 Check 1: compressed data conforms to CCITT Group IV
          recommendations.

    ******************************************************
    *                                                    *
    * Section 3.1.1 Raster data file header records      *
    *                                                    *
    ******************************************************

"rtype: 1"

 Check 2: data is of type I.

"rorient: 090,270"

 Check 3: the pel path "090" is a permissible value.
 Check 4: the line progression "270" is a permissible value.

"rpelcnt: 005616,008640"

 Check 5: the dimensions "005616,008640" are two positive integers.
 Check 6: the actual image width is 5616.
 Check 7: the actual image height is 8640.

"rdensty: 0200"

 Check 8: the raster image density is 200.
```

```
    ******************************************************
    *                                                    *
    * Section 6.3.2 Scanlines for engineering drawings   *
    *                                                    *
    ******************************************************

WARNING!
 Check 9: the width, 5616, does not conform to recommended values.
WARNING!
 Check 10: the height, 8640, does not conform to recommended values.

------------------------------------------------------------
```

ATTACHMENT 3 - VISUAL ANALYSIS OF IMAGES

FILE	SCORE	NOTES
D001R001	7	Satisfactory quality. Somewhat noisy, but not bad.
D001R002	10	CTN CAD generated file. Exceptional quality.
D001R003	10	CTN CAD generated file. Exceptional quality.
D001R004	10	CTN CAD generated file. Exceptional quality.
D001R005	9	Nice quality scan.
D001R006	10	CTN CAD generated file. Exceptional quality.
D001R007	10	CTN CAD generated file. Exceptional quality.
D001R008	10	CTN CAD generated file. Exceptional quality.
D001R009	10	CTN CAD generated file. Exceptional quality.
D001R010	1	Requires a rescan. Text exists which is unreadable. Lots of noise present.
D001R011	4	Lots of noise present. All the text is readable, but the quality is very poor.
D001R012	1	Unsatisfactory quality. Requires a rescan. Threshold needs to be adjusted on scanner.
D001R013	1	Not acceptable. Should be rescanned. Text in places can not be read.
D001R014	10	Synthetic image produced by CTN.
D001R015	10	Synthetic image produced by CTN.
D001R016	10	Synthetic image produced by CTN.
D001R017	10	CTN CAD generated file. Exceptional quality.
D001R018	8	Good quality scan. A little dark.
D001R019	9	Outstanding scanned quality. Image is sharp. Lines are clean. No noise is present.
D001R020	6	The scan quality is very good, however there is a skew of one degree. This is disturbing to the eye.
D001R021	8	Good quality scan. Some noise is present.
D001R022	7	Good quality scan, however some skew is present.

APPENDIX B DSREDS Test Script

The following test plan was proposed for the DSREDS LAT test. Copies of this test plan outline were provided to the participants at the MICOM LAT, Huntsville:

DSREDS TEST SCRIPT

Predicated on the pre-test discussions with the DSREDS PM and representatives of the contractors, it is the understanding of the CTN that the DSREDS system is an existing digital data system with the following capabilities:

1. Raster image scan/capture capability.
2. Raster image compression capability.
3. Raster image QA display/edit capability
4. Image database/storage capability.
5. Image database/retrieval capability.
6. DSREDS format raster image interchange capability.

The previously stated functions are in place and operational and not intended for re-certification.

Modification of the DSREDS system has been undertaken to provide a CALS data format import/export option. The data interchange strategy is to translate CALS data entering the system into DSREDS format and to translate DSREDS data into the CALS format upon leaving the system. CTN testing is intended to:

1. Evaluate the newly implemented capabilities to determine if the targeted functionality is "CALS ready."

2. Assist the DSREDS PM to evaluate the impact (if any) on the existing DSREDS system.

The PM has stated his requirements are that the CTN Raster Test Suite data loop through the complete DSREDS process.

The CTN test script shall:

1. Read test suite into the systems.
2. Convert test data to DSREDS data format.
3. Present test data for QA.
4. Annotate each test file to indicate DSREDS acceptance.
5. Release test data for storage on the optical media.
6. Retrieve test data from the optical media.
7. Retrieve 1 each "A" to "J" DSREDS native unclassified images from optical disk.
8 Present retrieved data for viewing.
9 Queue retrieved data for export interchange.
10. Convert retrieved data to CALS format.

11. Write two copies of the retrieved data tape in CALS format.
12. Mail tape to the CTN for evaluation.
13. Mail tape to AUDRE for independent evaluation.

In the process of handling the data, the following issues will be addressed:

1. Is the system able to read MIL-STD-1840A tapes?
2. Can the system detect erroneous Group-4 encoding?
3. Is the system able to generate valid Group-4 encoding?
4. Is the system able to write MIL-STD-1840A tapes?

The CTN representative will :

1. Provide a MIL-STD-1840A tape containing the Raster Test Suite.
2. Provide a two volume MIL-STD-1840A tape set containing miscellaneous CALS files.
3. Provide an evaluation of the returned test tape focusing on:
   a. MIL-STD-1840A packaging
   b. MIL-STD-1840A format issues
   c. ANSI X3.27 format issues
   d. MIL-R-28002 issues (returned test suite)
   e. CCITT T.6 encoding

AUDRE Inc will :

1. Audit and comment on the data interchange procedure
2. Audit and comment on the returned test tape regarding:
   a. MIL-STD-1840A packaging
   b. MIL-STD-1840A format issues
   c. ANSI X3.27 format issues
   d. MIL-R-28002 issues (native DSREDS data)
   e. CCITT T.6 encoding

DSREDS contractors will provide:

1. (2) MIL-STD-1840A tapes both containing:
   a. Annotated test suite files D001R001 through D001R018
   b. Native DSREDS files, 1 each "A" to "J" size
2. Shipment of tapes to the test facilities.
   a. Package tapes individually as per MIL-STD-1840A
   b. Ship one tape to the CTNO Test Bed at:

      Lawrence Livermore National Laboratory
      Attn: Nick Mitschkowetz
      Mail Stop L-542
      7000 East Avenue
      Livermore, CA 94550

   c. Ship one tape to:

      AUDRE, Inc.
      Attn: Melody deJong
      10915 Technology Place
      San Diego, CA 92127

APPENDIX C LAT Test Notes

Laboratory Acceptance Test (LAT) notes taken at the DSREDS LAT, Huntsville 20 February 1991:

(11:10) The Intergraph Sub-system loaded and read a CTN Raster Test Suite tape. The first tape was formatted strictly according to MIL-STD-1840A. Unused portions of the header block were padded with circumflex accent ("^") characters, to a full 2048 bytes (as recommended by ANSI X3.27). The Intergraph system captured all 18 MIL-R-28002 files from the tape but was, predictably, unable to reconcile the image data in the files.

This rather common anomaly is caused by various commercial magnetic tape I/O utilities which are sensitive to ("^") the padding character. The CTN has recommended a change in the appropriate standard, requiring that the 2048 byte header be completed using "space" characters in place of the circumflex accent.

In anticipation, the CTN provided a second tape containing an identical raster data set, except that the "^" characters in the header blocks were replaced by "space" characters. As expected, the Intergraph Sub-system successfully parsed the image data from the 18 MIL-R-28002 files.

(11:35) The Intergraph import strategy analyzed the header and Group-4 compression files to screen for obvious errors, as the CCITT Group-4 data is being converted to an Intergraph RLE display format. Files D001R007 and D001R008 were flagged for header errors and D001R013 was flagged, indicating a Group-4 error. The first two files had line count errors and the last file had an erroneous mode encoding.

Additionally, QA indicators flagged several other files (D001R006, D001R014, and D001R015) for possible orientation errors. Intergraph evaluates pel-count/line-count ratios to determine possible orientation problems. This strategy obviously will not catch all such errors, but is an innovative approach to automated analysis.

(12:00) The flagged RLE files were displayed on the Intergraph Sub-system. Files D001R007 and D001R008 were correctly identified as having erroneous line counts. These were the synthetic hand encoded Huffman files, two of which had excessive line count parameters entered in header record-9 ("rpelcnt: "). This test was implemented to uncover systems that do not detect the CCITT Group-4 "end-of-file" encoding.

File D001R013 was correctly identified as containing bad Group-4 encoding data and was procedurally rejected at this step in the process.

The Hollerith data required by DSREDS was edited into the appropriate fields in each file header and the conversion started to translate the RLE format to DSREDS import format. The import format files were then transferred to the DSREDS host system over the Ethernet using a TCP/IP utility.

(12:10) Valid Raster Test Suite data (except file D001R013 which had been rejected) were imported into the DSREDS QA station. Here, a DSREDS operations staff member demonstrated the QA procedure. Each file was checked for image continuity and procedurally queued for release into the DSREDS optical archive.

DSREDS is not structured to handle roll images. Currently the system is only capable of handling data scanned from aperture cards and rolled drawings are represented in a multiple frame format. The "J" size image provided as part of the Raster Test Suite was rejected at this point.

The preferred DSREDS procedure will be to maintain the current "E" size image limits. A utility to section "J" size drawings into "E" size panels will be implemented on the Intergraph Sub-system.

Since the current DSREDS system is not capable of archiving new images on line, and the testing was proceeding during normal operations, the archive activity was delayed till the DSREDS system could be safely taken off line during the lunch hour.

The production crew archived the 17 test images and brought the system back on line after lunch. The 17 Raster Test Suite images were brought back out of the optical storage media and queued for production.

At this stage an additional set of native DSREDS images were requested for inclusion in the data. There was to be one each "A" through "E" size drawings. Additionally, the first 5 CTN Raster Test Suite images were to be annotated (red-lined) at the QA station before being exported to the Intergraph Sub-system for conversion to the CALS format.

Since identifying native DSREDS images and annotating the test data would occur during the normal production period, using the DSREDS operational personnel, and that data was to be mailed to the CTN in the appropriate MIL-STD-1840A packaging, it was determined that these processes could be performed at their convenience.

(14:00) Lunch break.

(15:00) The CTN Raster Test Suite data, which had been released onto the DSREDS system, was retrieved from optical storage. These images were converted from native DSREDS format to DSREDS export format and networked to the Intergraph Sub-system. Here, a conversion from DSREDS export format to RLE allowed the images to be compared to the original CTN Raster Test Suite.

These preliminary visual tests indicated that the CTN Raster Test Suite had successfully "looped-through" the CALS modified DSREDS system. A complete evaluation would require the same data to be annotated at the DSREDS QA station and be transferred to the CTN on the returned test tape.

The Intergraph conversion platform (Sub-system) was tested to determine its capability to read and generate a multiple tape volume data interchange. Unfortunately, the mini tape reels used by the CTN to test multiple tape volume reading and writing were physically too small for the Intergraph tape drive to load.

The multiple tape volume read/write test will be repeated as a Follow-on test.

APPENDIX D Follow-on Testing

Follow-on tests were conducted to address three issues which would impede CALS interchange activities. These issues were:

1. Multiple tape volume read and write.
2. Visual anomalies in a Huffman test file.
3. Short tape blocks at the end of data files.

The issues and the activities undertaken to target their resolutions are presented in this appendix. The intent in providing this information in an appendix is to provide a better focus on the issues without sacrificing the structure and clarity of the basic test document.

I. Multiple tape volume read and write .

The data provided by the CTN during the LAT included a two-tape volume data set. It was provided on the smallest physical 9-track tape reels commercially available today.

As a result, the Intergraph auto-loading tape drives were unable to load the tape and the test could not proceed. It was determined that the CTN should generate a new set of test tapes on larger tape reels.

The CTN restructured the multiple volume read-and-write test using larger reels. The new tape set was shipped to Intergraph by the CTNO/LLNL. This test was designed to demonstrate the successful reading and writing of multiple ANSI X3.27 tape volumes without requiring CTN observation.

Volume-1 of the two-tape set had been artificially shortened by placing an "End-of-tape" reflector soon after the "Beginning-of-tape" reflector. The tape available between these two marks contained the first four images (D001R001 to D001R004) of the CTN Raster Test Suite. Image five (D001R005) started on volume-1 but finished on volume-2, along with the rest of the Raster Test Suite.

Image D001R005 was altered to distinguish it from its counterpart in the standard Raster Test Suite. The multiple tape volume test required that all the images from the two test tapes be read. Image D001R005 was to be reconstructed as a valid MIL-R-28002 file. The entire modified Raster Test Suite was to be written back onto the same two tapes. However, it was required that the order of the files be altered so that images D001R005 and D001R001 were interchanged. This way a different test file would bridge the two tape volumes. The tapes were returned to the CTN for evaluation.

Evaluation of the returned tape was conducted on the Sun and DEC Test Platforms at LLNL. The CTN received three tapes generated by the DSREDS system. The accompanying documentation indicated that one tape contained a composite of the multi-volume tape set sent out by the CTN. The other two tapes were a DSREDS-generated multi-volume tape set.

The composite tape indicated that DSREDS had been able to read the CTN-generated test data, successfully reconstructing image D001R005 which spanned two tape volumes. All image data on this tape were intact.

However, the DSREDS-generated multi-volume tape set was not structured in consort with the ANSI X3.27 standard. The CTN found that the first tape had been terminated as though it were a single volume. It appears that two tape marks were written before the End-of-tape reflector.

The ANSI X3.27 (7.9.3.1) specification states:

"...the end of a file section is determined either when an End-of-tape marker is sensed while writing data in the file or when an applications program requests a volume switch. If the output is buffered, the system empties any records in the buffer at a volume switch. The system then writes a tape mark and then the End-of-Volume Label Set....."

Some commercial and public domain implementations of the ANSI X3.27 magnetic tape standard, which vendors are integrating into CALS utilities, do not implement the full functionality of the published ANSI standard. Moreover, reported limitations exist at a very low level in commercial magnetic tape sub-systems (in the system device driver).

Resolving such issues may require some computer systems vendors to re-engineer basic magnetic tape sub-systems or require system integrators to write custom device drivers to fulfill CALS requirements.

Neither option, applied to such an old technology, is particularly cost effective. A more desirable strategy may be to establish procedural requirements which circumvent the issue.

The CTN is reserving recommendations on this issue until the tri-service repository tests have been completed.

II. Visual anomalies in a Huffman test file.

In the analysis of the returned Raster Test Suite, the second Huffman test file (D001R007) had some additional data added to it. All the run-length encodings had been properly interchanged. However, some erroneous data had been added to the end of the file.

It was not clear at which stage in the test process the extra data had been added. To resolve the issue the Huffman test images were reprocessed as part of the multiple tape volume test.

Processing requirements included decompression to a bit-map format and recompression to a CALS MIL-R-28002 format. Processing the bit-map by a pixel editor was not required. The CTN has experienced introduction of erroneous data by some raster editors when attempting to edit files as small as the Huffman test files. A unique hand encoding in the original test files would indicate if the Group-4 data had been converted into a bit-map at the test site.

The Huffman test files returned to the CTN were analyzed on the Sun 3/280 Raster Platform. Visual inspection indicated that the all the Huffman run-length codes had been properly identified by the test system during decompression and compression. Further analysis indicated that the test images had, indeed, been decoded into a bit-map.

The Follow-on test indicated that the DSREDS system is correctly encoding and decoding Group-4 run-length data.

III. Short tape blocks at the end of data files.

The initial LAT data returned to the CTN had short tape blocks at the end of each image file and the Declaration file. The test images themselves were not affected. However, the last tape block in each image was truncated to the length of the data remaining in each file.

This anomaly does not necessarily affect the capability of image data interchanges between systems; most systems are capable of reading the variable length blocks which are left at the end of each file. However, the length of the remaining data may be as small as a single 128-byte fixed length record. Some systems may have trouble reading such a small data block, especially at a tape density of 6250 bits per inch.

The DSREDS contractor was asked to modify the system to pad out the last tape block in each file to a full 2048 bytes and demonstrate the alteration in the data passed back to the CTN as part of the multi-volume Follow-on test.

Analysis of the data returned to the CTN indicated that all tape blocks were written to a full 2048 bytes.

Copies of the related correspondence with respect to the Follow-on tests are attached.

CALS TEST NETWORK
Automated Interchange of Technical Information Project

11-March-1991

INTERGRAPH Corp.
Att: Mark E. Moss
Huntsville, AL 35894-0001

Mark;

As per our telephone conversation today, enclosed is the material you requested.

1. IGES Class-I CTN sample test data.
2. Multi volume MIL-STD-1840A test tapes.

David Taylor Research Center (DTRC) has taken the lead role in the IGES arena. The contact at DTRC is Joe Garner, telephone number is (301) 227-1533. I understand his Internet E-mail address is "garner@dtrc.dt.navy.mil."

The appropriate EDI contact at the Livermore Technical Information Systems Program (TISP) Dana Ellingen, I am passing your request for EDI/X.12 information on to him. He may be reached at (415) 423-4582.

The new multi-volume raster tapes are larger than the ones I brought out to MICOM for the Bench Test, they should mount in your auto-loader tape drive without any problem. The tapes contain a version of the (now familiar) raster test suite. The first tape, "CTNN01", has been artificially shortened by placing an End-Of-Tape mark (EOT) a short distance in from the beginning of the tape.

The short tape volume causes the eighteen (18) raster test images to overflow to the second volume. The object of the test is to determine if the target system can correctly read in the image that is split between the two tapes. Additionally, the same volumes may be used to determine if the system can write data spanning between tape volumes.

The test scenario simply requires that the target system read the raster images from the two tapes, then internally, reorganize the file sequence so that the d001r001 and d001r005 files are interchanged. The system should write all the files back to the tape volumes, with the first and fifth files interchanges. The tapes should be appropriately packaged and returned to the CTN for evaluation:

Lawrence Livermore National Laboratory
Att: Nick Mitschkowetz
Mail Stop L-542
7000 East Avenue
Livermore, CA 94550

Please feel free to contact me at that address or telephone (415) 422-0582. My Internet Address is "mitsch@ati.tis.llnl.gov."

Nick Mitschkowetz
Lead Raster Analyst
CTNO/LLNL

CALS TEST NETWORK

Automated Interchange of Technical Information Project

20-March-1991

INTERGRAPH Corp.
Att: Jim Foscue
M/S IW-1510
Huntsville, AL 35894-0001

Jim:

In reference to our telephone conversation earlier today, enclosed is another multiple volume MIL-STD-2840A tape set to facilitate the completion of the CTN Development Level Testing scenario. As you recall, the tapes I had intended to use during that test were too small to successfully load in your tape drives. The tapes currently provided are physically larger but have been artificially reduced in capacity to facilitate this test.

Volume-1 of the two tape set has an end-of-tape (EOT) reflector installed reasonably close to the load point or beginning-of-tape (BOT) reflector. This situation results in an overflow condition about half way through writing the Raster Test Suite onto this tape (at 1600 BPI). Image D001R005 starts at the end of volume-1 and is carried over to volume-2.

The Strategy for the test,is simply to verify that a system can read and write multiple tape volume sets by reading the data from the test media (successfully reassembling image D001R005) and writing the data back to the same two tapes, interchanging images D001R001 and D001R005. The image interchange will allow the CTN to verify that the data had been read correctly by the system being tested.

The multiple volume data set produced at MICOM, during the Development Level Test, was difficult to evaluated because of the amount of data required to fill the first volume. The smaller amount of data required to fill the shortened tape should simplify the test process. If they can be located, I would appreciate the return of the tape set I sent Mark Moss last week, this will help reduce material cost and effort at the CTN.

A cursory analysis of the Development Level Test data, returned to the CTN in the mail, indicates the Intergraph system is well on is way to being able to read and write MIL-STD-1840A tapes that can be interchanged with any "CALS ready" system. The data had "looped-through" the DSREDS system and was read back into the CTNO/LLNL test platforms without difficulty. The images were all accounted for and

displayed without incident. However, some minor issues need to be addressed.

I did notice that the last tape block in each file was truncated. Although both CTN systems (the VAX and the SUN) were able to read the tapes without trouble, the strategy of truncating the last tape block does provide the possibility of writing a minimum physical tape block as small as 128 character (one fixed length record). Since some tape drives have trouble reading short blocks, (especially at 6250 BPI) it has been suggested that all data blocks be padded out to their full 2048-byte length. This is even more imperative in light of the fact that the EDCARS/IBM system is unable to read tapes written with random length blocks.

The blocking length issue extends to the Declaration file, which contains less than a block's worth of data. If your system is unable to pad the block full, it may be necessary to write several dummy records, forcing a full block to be written, as I have done with the header on the volume-1 of the multiple volume data set (using the CTN VAX).

A minor issue is the orientation parameter. One of the CTN Raster Test Suite images has an invalid orientation that needs to be recognized and corrected on return. I am including some documentation I started to develop, to help people understand orientation. Let me know if this documentation helps or if it further confuses the issue.

The last issue deals with the synthetic Huffman images. Your system did decode and re-code all the run-lengths correctly. However, the file depicting "make-up codes" for pel counts between 64 and 1728 (the D001R007 of the Raster Test Suite) had two lines added at the very end. I would like to determine if this was just an aberration or if extra small images are causing decoding problems.

Another MIL-STD-1840A tape containing 15 images is included. I have attempted to populate header record-1 ("srcdocid: ") with DESRED formatted data, to allow these files to pass your QA station. The Huffman test files are included. Please re-run the "loop-through" test and return the data to the CTN for analysis. Annotation of the images will not be necessary. All images on this tape are good; there are no introduced encoding errors to test for.

Since the process is going so smoothly, I thought I might take this opportunity and provide one more tape. This one contains random images exported from the Sacramento EDCARS system. I am not that familiar with either DSREDS or the EDCARS Hollerith requirements, in terms of required data fields and acceptable ranges of content. However, the MIL-STD-1840A data structure and the MIL-R-28002 Image data

should transfer into the Intergraph system with minimal perturbation.

The object of the EDCARS tape is to demonstrate basic inter-operability by loading some selected EDCARS images into the DSREDSsystem, "red lining" them and sending them back to EDCARS. The first step will be to move them into the DSREDS environment.

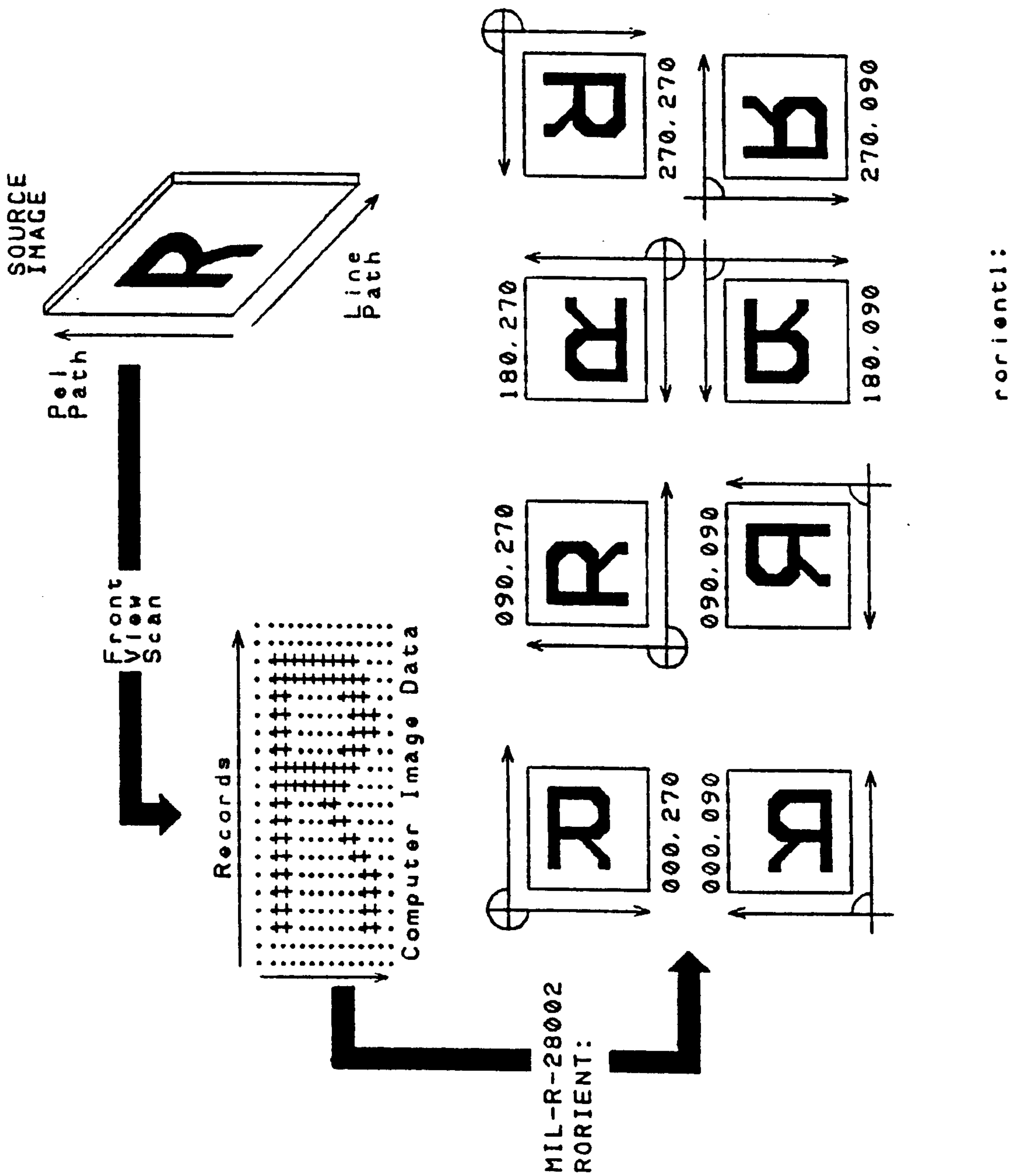
Henry Younger called to let me know that the optimization of the software in the Intergraph system has improved the systems performance significantly. I am very interested in that aspect of the project and look forward to talking with you about it. If it's convenient, I would like to discuss this and the previous test issues with you next week, by telephone.

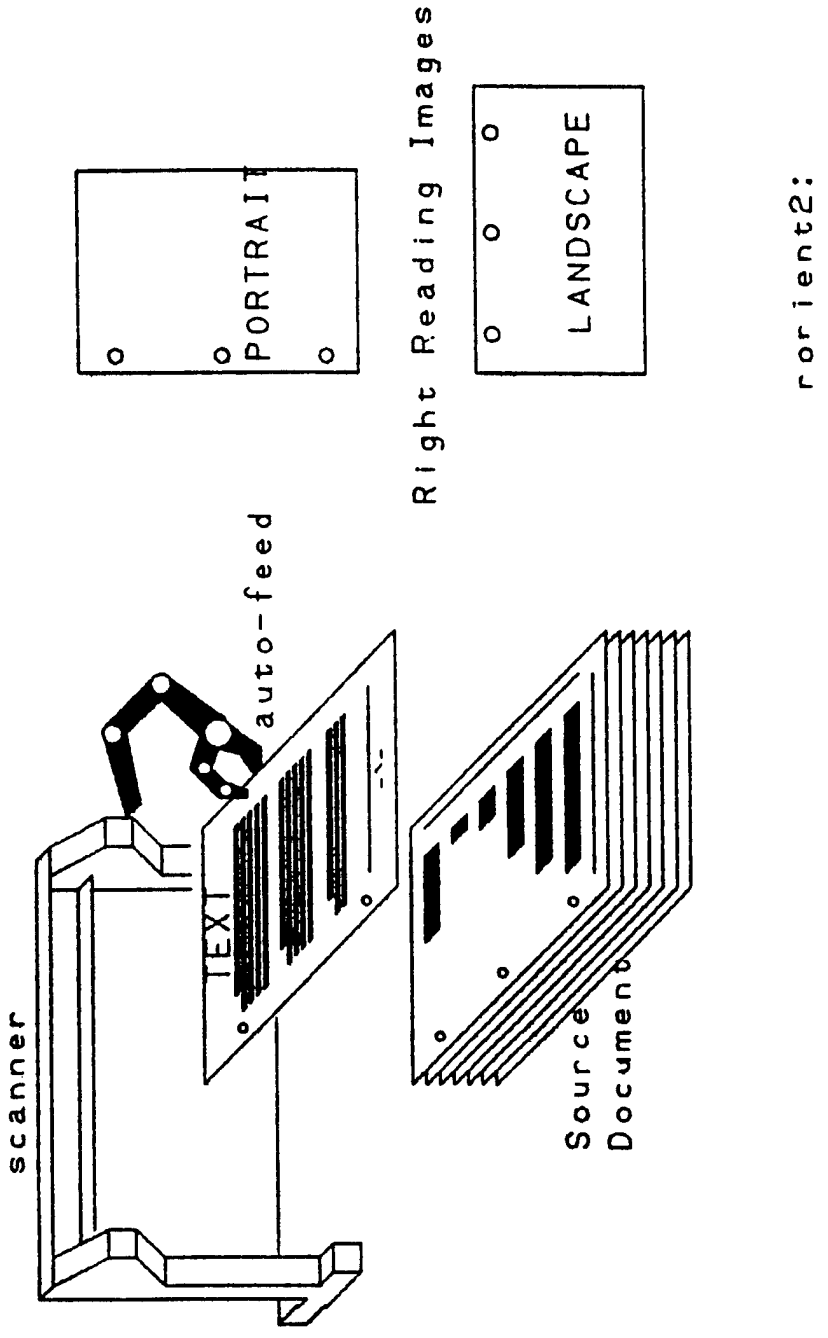
I have enjoyed working with you, Mark Moss and Henry Younger. I am confident that we will be able to demonstrate the interconnectivity that CALS is targeting. I hope we can get the unresolved issue under control in the near term. It would be advantageous to present some positive results to Dr McGrath during his visit next month.

Incidentally, as Henry had requested, I did send two IGES tapes to Mark (a Class-1 and a Class-2). If that data has not shown up by the time I contact you next week, I will send another set.

Thanks again for the support you have been giving the CTN on these test issues. If there is anything I can help you with, please feel free to contact me at (415) 422-0582 or on the Internet at "mitsch@ati.tis.llnl.gov."

Nick Mitschkowetz
Lead Raster Analyst
CTNO/LLNL


SOURCE IMAGE
Pel Path
Line Path
Front View Scan
Records
Computer Image Data
MIL-R-28002 RORIENT:
000,270
000,090
090,270
090,090
180,270
180,090
270,270
270,090
rorient1: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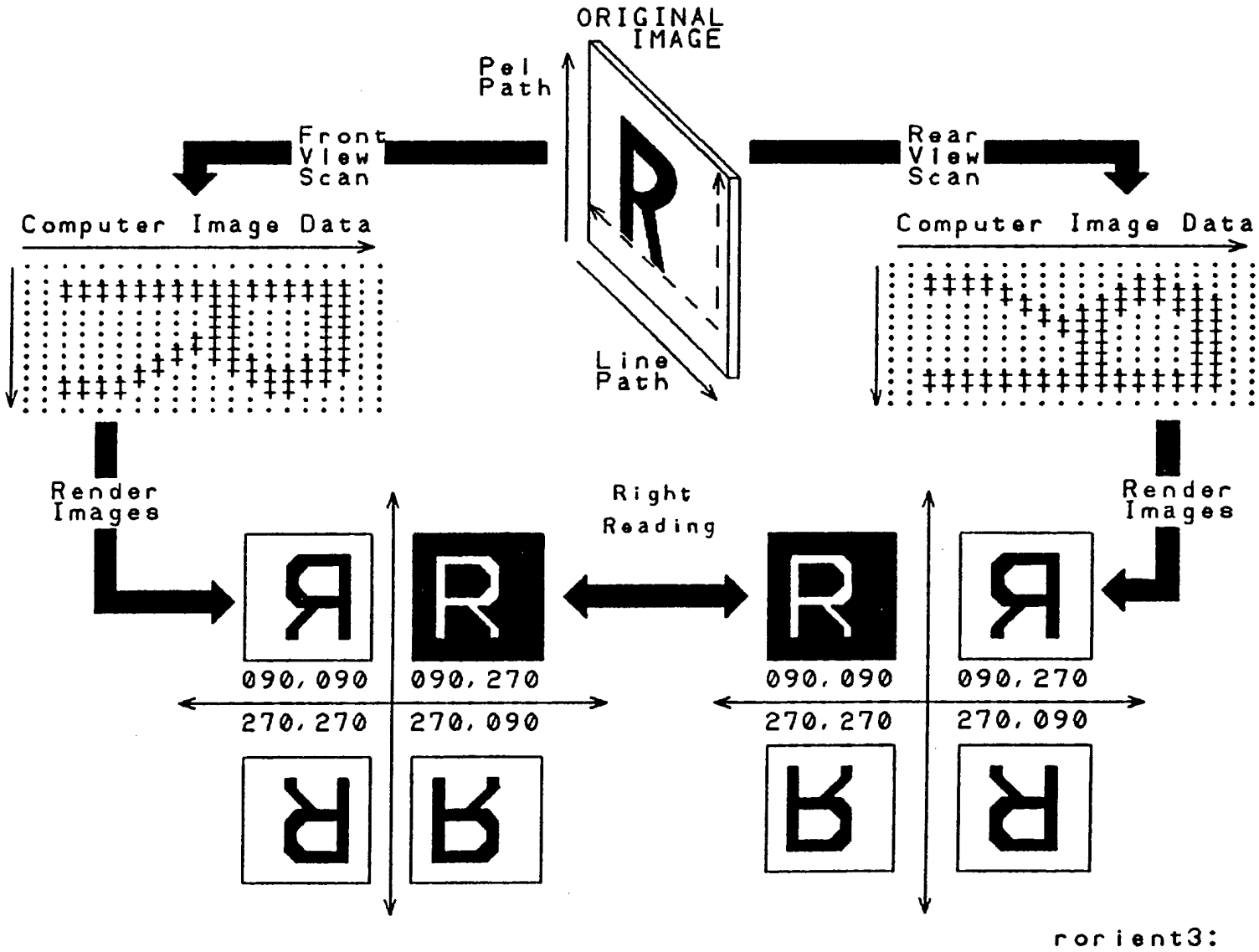
Right Reading Images
PORTRAIT
LANDSCAPE
auto-feed
TEXT
scanner
Source
Document


ORIGINAL IMAGE
Pel Path
Front View Scan
Rear View Scan
Computer Image Data
Computer Image Data
Line Path
Render Images
Render Images
Right Reading
090, 090
090, 270
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APPENDIX E Acronyms and Standards

Acronyms Expanded

ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
AT&T	American Telephone and Telegraph
BOT	Beginning of Tape
BPI	Bits Per Inch
CALS	Computer-aided Acquisition and Logistic Support
CCITT	Comite Consultatif Internationale de Telegraphique et Telephonique (English: International Consultative Committe on Telegraphy and Telephony)
CTN	CALS Test Network
CTNO	CALS Test Network Office
DEC	Digital Equipment Corporation
DEETT	DSREDS, EDCARS, and EDMICS Test Team
DoD	Department of Defence
DSREDS	Digital Storage and Retrieval Engineering Data System
DTRC	David Taylor Research Center
EDCARS	Engineering Data Computer-Assisted Retrieval System
EDMICS	Engineering Data Management Information and Control System
EOT	End of Tape
I/O	Input/Output
IBM	International Business Machines
JCMO	Joint CALS Management Office
LAT	Laboratory Acceptance Test
LLNL	Lawrence Livermore National Laboratory
MB	Megabyte
MICOM	Missile Command
NIST	National Institute of Standards and Technology
PM	Program Manager
QA	Quality Assurance
RLE	Run-Length Encoded
TCP/IP	Transmission Control Protocol/Internet Protocol
TISP	Technology Information Systems Program
UAT	User Applications Test
UNIX	(A name, not an acronym -- originally printed in "all small caps")
VAX	Virtual Address Extension (DEC)
VMS	Virtual Memory System (DEC)

Standards Referenced

ANSI X3.27
ASTM-D-39951
CCITT Recommendation T.6
MIL-HDBK-59A
MIL-R-28002
MIL-STD-1840A
PPP-B-636